DELAWARE RIVER BASIN
UNNAMED TRIBUTARY OF TWO MILE RUN
PENNSYLVANIA

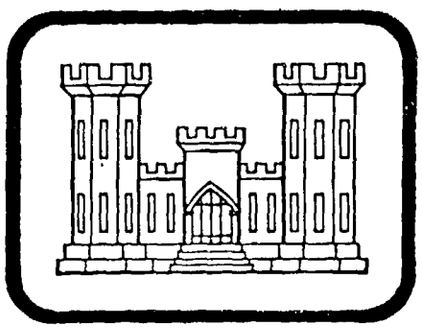
NDI ID PA 00604
PA DER 45-238

SINCAVAGE LUMBER COMPANY DAM (LAKE SINCA DAM)

OWNED BY

SINCAVAGE LUMBER COMPANY

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



PREPARED FOR
DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT CORPS OF ENGINEERS
BALTIMORE, MARYLAND
21203

BY

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PHILADELPHIA, PENNSYLVANIA
19103

AUGUST 1981

SINCAVAGE LUMBER COMPANY DAM
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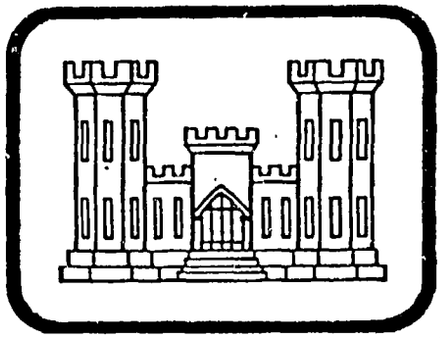

DACW31-81-C-0016

Prepared for:

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
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AUGUST 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected, and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

Name of Dam:	Sincavage Lumber Company Dam
State:	Pennsylvania
County:	Monroe
Stream:	Unnamed Tributary of Two Mile Run
Coordinates:	N41°01.2',W75°35.5'
Date of Inspection:	April 8, 1981

ASSESSMENT

The Sincavage Lumber Company (Lake Sinca) Dam is a 23.5-foot high, 1,100-foot long earth embankment, constructed in 1969 to impound water for recreational use. The dam impounds Lake Sinca with a surface area of 29 acres and a storage capacity of 221 acre-feet at the low point of the top of the dam. The dam has an average crest width of 14 feet and a typical downstream slope of 2 :1V. The upstream face of the dam slopes at approximately 3H:1V and is pr cted with random size loose riprap. The principal spillway, including the low evel outlet system, is located near the center of the dam and consists of a 4-foot square drop inlet structure, an 18-inch square low level sluice gate, and a 30-inch diameter corrugated metal pipe, which conveys discharge from the intake structure to the principal spillway discharge channel. A 75-foot wide emergency spillway is located at the northeastern dam abutment.

Sincavage Lumber Company Dam is a "Small" size, "Significant" hazard structure. The recommended Spillway Design Flood (SDF) for a "Small" size, "Significant" hazard dam ranges from the 100-year flood to one half of the Probable Maximum Flood (PMF). Because of the proximity of the potential hazard area, the selected SDF is one-half of the PMF. The spillway system, which is capable of discharging the SDF, is classified as "Adequate".

Based upon the visual inspection of the dam and review of the drawings provided by the Pennsylvania Department of Environmental Resources (DER), the Sincavage Lumber Company Dam is considered to be in poor condition. The deficiencies observed are reflected in the following recommendations and remedial measures and discussed in detail in the appropriate sections of this report.

Recommendations and Remedial Measures

The recommendations and remedial measures should be initiated immediately.

a. Facilities

The Owner should retain the services of a licensed professional engineer, experienced in the design and construction of dams, to assist in the implementation of the following recommendations:

1. Detailed stability and seepage analyses of the embankment and foundation should be performed. In addition, the toe drains should be investigated to determine if they are functioning properly.

2. Access to the intake structure should be provided to facilitate routine and emergency operation of the low level gate.

3. The concrete outlet structure of the principal spillway should be repaired.

The Owner should initiate the following remedial measures:

1. Small trees and brush should be removed from the dam, particularly along the upstream face of the dam. The resulting voids should be backfilled with suitable compacted material. A cover of grass should be established in the affected areas.

2. Riprap along the upstream face of the dam should be replaced. The settled portion of the upstream face of the dam, just above the riprap, should be filled, regraded and reseeded.

3. Boulders present on the downstream face of the dam should be removed. Also, sloughed or settled areas should be backfilled with suitable material, compacted and provided with a good cover of grass.

4. A good cover of grass, or other means of protection against erosion, should be provided on the emergency spillway. Additional protection should be provided on the south side of the emergency spillway discharge channel and also at the outlet of the principal spillway.

b. Operation and Maintenance Procedures

1. An operation and maintenance program should be developed and implemented. This program should include periodic operation of outlet works, routine maintenance tasks, and an annual technical inspection performed by a licensed professional engineer, experienced in the design and construction of dams.

2. A monitoring and downstream warning plan should be developed and implemented during periods of extreme rainfall to ensure that downstream residents and the appropriate agencies are notified in the case of impending dam failure.

O'BRIEN & GERE ENGINEERS, INC.

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL JOHN J. WILLIAMS ENGINEER No. 6920 E

John J. Williams Date: 19 Aug. 1981

John J. Williams, P.E.
Vice President
Pennsylvania Registration No. PE-006920-E

Approved by: Date: 31 Aug 81

JAMES W. Peck
Colonel, Corps of Egingeers
District Engineer

UPSTREAM OVERVIEW FROM THE LEFT ABUTMENT. (4/8/81)

DOWNSTREAM OVERVIEW FROM THE LEFT SIDE. (4/8/81)

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PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM
SINCAVAGE LUMBER COMPANY DAM
NDI ID PA 00604
PA DER 45-238

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if the Sincavage Lumber Company Dam constitutes a hazard to human life and property.

1.2 Description of Project (Based on information obtained from the Pennsylvania Department of Environmental Resources (DER), Division of Dam Safety, Harrisburg, PA, Mr. John Dennis of Edward C. Hess Associates, Mr. William Sincavage of the Sincavage Lumber Company and from the field inspection.)

a. Dam and Appurtenances. The Sincavage Lumber Company Dam is a 23.5-foot high, 1,100-foot long earth embankment, constructed in 1969 to impound water for recreational use. The dam impounds Lake Sinca with a surface area of 29 acres and a storage capacity of 221 acre-feet at the low point of the top of the dam. The average crest width is 14 feet, the average downstream slope is 2.5H:1V and the upstream slope, which is about 3H:1V, is protected with random size loose riprap. According to the drawing of the dam, a 12-inch thick layer of filter material was installed under the riprap on the dam face. A 3-foot deep by 20-foot wide key trench was excavated under the upstream portion of the dam.

The principal spillway consists of a 4-foot square drop inlet structure and a 30-inch diameter corrugated metal pipe, encased in concrete, which conveys discharge from the lake to the principal spillway outlet channel. The intake structure has a trash rack mounted over its 4-foot square horizontal opening to prevent large debris from entering and plugging the outlet pipe. An 18-inch square, low level, seating head intake gate is located on the upstream face of the intake structure. Anti-seep collars are located at 20-foot intervals along the outlet pipe. Access to the intake structure is by boat.

A 75-foot wide emergency spillway channel is located at the northeastern dam abutment. The emergency spillway discharge channel extends downstream along the embankment and abutment junction area and merges with the principal spillway outlet channel just downstream of the dam. No riprap protection or grass cover has been provided on the emergency spillway. A house is located just downstream of the dam adjacent to the emergency spillway discharge channel.

The dam has a toe drain system, consisting of 6-inch diameter perforated concrete pipes, extending in either direction from the principal spillway outlet pipe headwall. As indicated on drawings of the dam, a 3-foot deep layer of coarse filter material was installed under the downstream portion of the dam to collect seepage and direct it to the toe drain pipes. The lengths of the toe drain pipes are not known, but the drawings show that they were designed to have been installed a minimum of three feet below the stripped ground line.

b. Location. The Sincavage Lumber Company Dam is located on an Unnamed Tributary of Two Mile Run in Tobyhanna Township, Monroe County, Pennsylvania. A portion of the USGS Quadrangle Map entitled "Blakeslee, PA" has been included as Figure 1 of Appendix E. USGS reference coordinates for this dam are N41°01.2' and W75°35.5'.

c. Size Classification. The Sincavage Lumber Company Dam has a maximum height of 23.5 feet and a maximum storage capacity of 221 acre-feet at the low point of the top of the dam. The dam is, therefore, classified as a "Small" size dam (height less than 40 feet and maximum storage capacity less than 1,000 acre-feet).

d. Hazard Classification. One habitable structure, located just downstream of the dam and adjacent to the emergency spillway discharge channel, comprises the hazard area. Failure of the dam could cause appreciable property damage with the possible loss of a few lives. Therefore, the Sincavage Lumber Company Dam is classified as a "Significant" hazard structure.

e. Ownership. The dam is owned by the Sincavage Lumber Company, 60 Maffett Street, Plains, PA (Tel. 717-823-4193). All correspondence should be addressed to Mr. William T. Sincavage, Sr. at this address.

f. Purpose of Dam. The dam was constructed to encourage area real estate development by creating a lake to be used for recreation.

g. Design and Construction History. The Sincavage Lumber Company Dam was designed by Edward C. Hess Associates of Stroudsburg, Pennsylvania, and constructed by the Owner. Construction commenced in the fall of 1968 and, due to heavy rains during the summer of 1969, was not completed until the spring of 1970. No changes to the dam have been made since its original construction.

h. Normal Operating Procedures. The water level of Lake Sinca is normally within a few inches of the crest of the drop intake structure, Elevation 1628. Drawdown of the lake may be accomplished by opening the 18-inch square sluice gate located on the upstream face of the intake structure. Access to the structure is by boat.

1.3 Pertinent Data

a. Drainage Area.

Square Miles	0.45

b. Discharge at Dam Site. (cfs)

Spillways (Water surface at top of dam low point, El 1631.5)	430
Spillways (Water surface at top of dam design elevation, El. 1632.9)	1,200
Outlet Works (Water surface at normal pool, El. 1628)	34

c. Elevation. (MSL)

Top of Dam (Design)	1,632.9
Top of Dam (Low Point)	1,631.5
Emergency Spillway Crest	1,630.2
Principal Spillway Crest	1,628.0
Outlet Works (Inlet Invert)	1,610.5
Outlet Works (Outlet Invert)	1,609.6
Streambed at Toe of Dam	±1,608.0

d. Reservoir Length. (Feet)

Normal Pool	1,300
Maximum Non-Overtopping Pool	1,500

e. Storage. (Acre-feet)

Normal Pool, Elevation 1,628.0	132
Top of Dam (Low Point) Elevation 1,631.5	221
Top of Dam (Design) Elevation 1,632.9	267

f. Reservoir Surface Area. (Acres)

Normal Pool, Elevation 1,628.0	22
Top of Dam (Low Point) Elevation 1,631.5	29
Top of Dam (Design) Elevation 1,632.9	33

g. Dam Data.

Type	Earth Embankment
Length	1,100 Feet
Height to low point of top of dam	23.5 Feet
Crest Width	14 Feet
Side Slopes (Upstream)	3H:1V
(Downstream)	2.5H:1V
Zoning	None
Impervious Core	None
Cutoff	3-foot deep by 20-foot wide key trench filled with embankment material
Grout Curtain	None

h. Spillway Data

1. Principal Spillway

Type	Reinforced concrete drop inlet closed conduit
Weir Length of Drop Inlet	16 Feet
Crest Elevation	1,628.0
Conduit Size	30-inch diameter
Inlet Channel	Impoundment
Exit Channel	10 to 20 feet wide, 4H:1V side slopes, slight gradient little or no bank protection

2. Emergency Spillway

Type	Open channel earth chute
Crest Length	75 Feet
Crest Elevation	1,630.2
Gates	None
Inlet Channel	75-foot wide earth channel with no protection against erosion with 3H:1V side slopes.
Downstream Channel	75-foot wide earth open channel with no protection against erosion with 3H:1V side slopes. Discharge channel follows downstream embankment and north-eastern dam abutment junction areas.

i. Outlet Works.

The outlet works consist of an 18-inch square, seating head gate on the upstream endwall of the principal spillway drop inlet structure. The invert of the gate is at Elevation 1611.0. The operator for the gate is mounted on the drop inlet structure.

SECTION 2

ENGINEERING DATA

2.1 Design

a. Data Available. Miscellaneous correspondence, memoranda and permit information are available at the main office of the Pennsylvania DER in Harrisburg, Pennsylvania. The following drawings for Lake Sinca, dated March 1968, are available from the Edward C. Hess Associates of Stroudsburg, Pennsylvania:

Sheet 1: Plans, Sections and Details of the Dam, Outlet Works, and Toe Drain installation.

Sheet 2: Principal Spillway Intake Tower, Outlet Structure, Anti-Seep Collar and Concrete Encasement Detail. Emergency Spillway Section and Profile.

b. Design Features. The design features of the dam are described in Section 1.2a and shown on the design drawings included in Appendix E.

2.2 Construction

Based on field measurements and subsequent discussions with the Owner, it appears that the dam was constructed in general conformance with the dimensions indicated on the drawings. One notable exception is that the emergency spillway is approximately twice as wide as shown on the drawings. No specifications, materials analyses or other construction information is available.

2.3 Operation

Operation of the outlet works at the dam is necessary only when it is desired to lower the level of Lake Sinca. The procedure requires the use of a boat for gaining access to the intake structure and the use of a short gate stem operator. The operator must be lowered into the water, placed over a stem nut on the submerged gate stem, and rotated to open the gate.

2.4 Evaluation

a. Availability. The engineering data presented in this report were provided by the Pennsylvania DER, Edward C. Hess Associates and Mr. William T. Sincavage, Sr., of the Sincavage Lumber Company.

b. Adequacy. The information obtained from the aforementioned sources, along with the information obtained during the visual inspection of the site, has been adequate for a Phase I evaluation.

c. Validity. The available information from the referenced sources appears to be valid. Little information is available with regard to the physical properties of the embankment material of the dam and construction procedures.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The Sincavage Lumber Company Dam was inspected on April 8, 1981. At the time of inspection, the water surface elevation of Lake Sinca was a few hundredths of a foot above the crest of the drop inlet structure, Elevation 1628. Underwater areas were not inspected.

Observations and comments of the field inspection team are presented in Appendix A of this report.

b. Dam. The dam appears to be in poor overall condition. Seepage, slope failure, and a "bulge" located at the southwest dam abutment indicate the possibility of slope instability. At the time of inspection, roughly 10 gpm of seepage was observed emerging from an area along an abandoned access road, appoximately 100 feet downstream of the dam. This condition is shown on Photo No. 10 of Appendix C, which illustrates water being "pumped" from the ground.

Further indication of seepage was observed just downstream of the dam and to the southwest of the outlet structure. Wet and soft conditions were observed over a large area extending approximately 300 feet out toward the southwest dam abutment and approximately 60 feet downstream of the dam. It was noted that this condition could also be caused by seepage from a leach field near the southwest dam abutment. According to the Owner, the leach field serves the adjacent Green Acres housing development.

A number of local slope failures were observed on the downstream face of the dam. The most notable area is located approximately 20 feet southwest of the outlet structure, near the mid-height of the dam, where a two-foot depression has developed. Another location of instability is located near the southwest dam abutment, where a 25-foot long "bulge" is present on the downstream face. This condition is illustrated on the downstream overview photo.

Several other features of the dam were observed to be in need of attention. The upstream face of the dam appears to have settled near the top edge of the riprap. Much of the riprap has been displaced, and small trees and brush have started to grow (Photos 2 and 5, Appendix C). The crest of the dam is in fair condition, except for some minor rutting and some low areas. (See Profile of Dam, sheet 11B of Appendix A.) The downstream slope of the dam, as previously noted, has several "sloughed" areas. In addition, boulders were found on the downstream face of the dam, which may indicate that they are present in the embankment as well (Photo 6, Appendix C).

c. Appurtenant Structures. The principal spillway is located near the center of the dam and consists of a 4-foot square reinforced concrete drop inlet structure and approximately 180 feet of 30-inch diameter CMP encased in concrete. The

intake structure could not be inspected because access was not available. From the dam crest it appeared to be in good condition. It has a bar trash rack, consisting of 0.5 inch diameter bars, spaced four inches on center, mounted horizontally over its four-foot square opening. The outlet structure, located at the downstream toe of the dam, is in poor condition. As illustrated on photos 11 and 12 of Appendix C, each of the wingwalls is cracked near its juncture with the headwall.

A 75-foot wide emergency spillway is located at the northeast dam abutment. As illustrated on photos 7 and 8 of Appendix C, the emergency spillway lacks adequate protection against erosion. The discharge channel follows along the downstream embankment and abutment junction area. No precautions have been taken to prevent erosion of the embankment.

The outlet works and toe drain system also appear to be in need of attention. The toe drain pipes extend in either direction along the toe of the dam from the principal spillway outlet structure. Seepage was noted around the outside of the northeast side toe drain pipe, but not through either of the toe drain pipes themselves. Because of this condition and the fact that seepage is occurring further downstream of the dam, it appears that the toe drains may be plugged.

The 18-inch square, seating head, sluice gate located on the upstream endwall of the principal spillway intake structure is inaccessible except by boat.

d. Reservoir Area. The drainage area of Lake Sinca is moderately sloped and is forested. Roughly 50 percent of the area is developed and the remainder is forest covered. No evidence of sedimentation was observed in the lake.

e. Downstream Channel. The upper portion of the downstream channel is illustrated on photo 4 of Appendix C. This photo shows that no side slope protection has been provided, either at the low level outlet or further downstream along the channel. Approximately 160 feet downstream of the dam, the channel discharges through a 36-inch diameter corrugated metal culvert and continues westerly as a relatively flat and overgrown channel to Two Mile Run, approximately 2,500 feet further downstream.

3.2 Evaluation

The dam is in poor overall condition. The following conditions were observed which may indicate potential problems: 1) Seepage downstream of the dam and around the periphery of one of the toe drain pipes; 2) slope failures on the downstream face of the dam at the southwest dam abutment; and 3) settlement along the upstream face. The following deficiencies were also observed on the dam: 1) displacement of riprap along the upstream face of the dam; 2) presence of small trees and brush on the dam; 3) minor rutting and some low areas on the dam crest; and 4) the presence of boulders on the downstream face of the dam.

The emergency spillway, principal spillway, outlet works and toe drain system were also found to be deficient. The following conditions require attention: 1) lack of access to the principal spillway intake structure for maintenance and emergency

operation of the outlet works; 2) nearly total absence of grass cover on the emergency spillway; 3) no riprap or other means of protection at the principal spillway outlet or along the side of the emergency spillway discharge channel which is adjacent to the dam; 4) poor structural condition of the principal spillway outlet structure; and 5) the apparent inability of the toe drain pipes to collect seepage from the dam.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures

The only operable feature of the dam is the 18-inch square, seating head, sluice gate located at the base of the principal spillway intake structure on the upstream endwall. The gate is mounted over the low level intake and it is equipped with a stem which extends nearly to the crest of the principal spillway. The operating procedures involves gaining access to the intake structure by boat, lowering a gate stem over a nut on the submerged gate stem, and rotating the operator to open the gate. The gate stem operator is stored at the Owner's residence.

4.2 Maintenance of the Dam

According to the Owner, Mr. William T. Sincavage, Sr., maintenance of the dam is done on an "as needed" basis. From visual inspection of the dam, it appears that maintenance of the dam is minimal.

4.3 Maintenance of Operating Facilties

According to the Owner, the 18-inch square, low level seating head sluice gate has been operated only once since the dam was constructed in 1969. Routine operation of the gate is inconvenient because ready access to the principal spillway intake structure is not available. According to the Owner, the gate is believed to be operable.

4.4 Description of any Warning Systems in Effect

According to the Owner, the dam would be monitored during heavy rainfall events and downstream residents would be notified of any impending failure or possible flooding. No formal surveillance and warning system is in effect.

4.5 Evaluation

As indicated in Section 3.1, the lack of an operation and maintenance program is reflected by the deteriorated condition of the dam. The deficiences identified during visual inspection of the dam and appurtenances should be corrected in a timely manner.

Once the improvements are made, a program should be implemented to periodically operate the low level sluice gate, maintain the dam and spillways, and provide for an annual technical inspection of the dam.

In addition, a formal surveillance and downstream warning system should be developed and implemented during periods of extreme rainfall.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features

a. Design Data. The Sincavage Lumber Company Dam has a 0.45 square mile drainage area and impounds 221 acre-feet of water at the low point of the top of the dam. The drainage area lies generally to the southeast of the dam and consists of moderately sloped and forested terrain, ranging in elevation from Elevation 1725 at the eastern boundary of the drainage area to Elevation 1628 at normal pool elevation. Approximately 50 percent of the area is developed. No original hydrologic or hydraulic calculations are available.

b. Experience Data. Operation and maintenance records for the dam are not maintained. According to the Owner, the level of Lake Sinca does not vary by more than a few inches and discharge has never occurred in the emergency spillway.

c. Visual Observations. From the dam crest, the principal spillway appears to be in good condition.

The emergency spillway, which is located at the northeastern abutment, extends along the downstream embankment and abutment junction area to the principal spillway outlet channel. It lacks adequate protection against erosion and no precautions have been taken to prevent erosion of the embankment.

d. Overtopping Potential. The recommended Spillway Design Flood (SDF) for a "Small" size, "Significant" hazard dam ranges from the 100-year flood to one half of the Probable Maximum Flood (PMF). Because of the proximity of the potential hazard area, the selected SDF is one-half of the PMF.

Hydrologic and hydraulic calculations were performed with the assistance of the HEC-1-DB computer program. Refer to sheet 2 of Appendix D for a brief description of the program. The SDF was routed through the reservoir with the starting water surface elevation at the principal spillway crest, Elevation 1628.0. The peak design flood inflow to Lake Sinca was computed to be approximately 500 cfs. The corresponding peak outflow was computed to be 370 cfs.

e. Spillway Adequacy. The combined spillway capacity of the Sincavage Lumber Company Dam is sufficient to pass the SDF without overtopping the embankment. Therefore, the spillway is classified as "Adequate".

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. Several conditions were observed during the visual inspection which could indicate the presence of structural problems. Seepage (10 gpm) was observed approximately 100 feet downstream of the dam (Photo 10, Appendix C), slope failures of varying degrees were found over both faces of the dam (Photo 9, Appendix C), and a 25-foot long horizontal "bulge" was found at the southeastern dam abutment. In addition, the following conditions could indicate or eventually lead to structural problems: 1) lack of protection against erosion along the emergency and principal spillway outlet channels; 2) settlement of the upstream face of the dam near the top of the riprap; 3) the possibility of plugged toe drains; 4) the absence of riprap or other means of erosion protection at the principal spillway outlet and along the south side of the emergency spillway; and 5) the presence of large stones on the downstream slope of the dam, which could indicate that such material is present throughout the embankment (See Section 3 for more detail).

Based on visual observations, the dam does not appear to be stable for normal loading conditions.

b. Design and Construction Data. Design drawings were obtained from the Edward C. Hess Associates of Stroudsburg, Pennsylvania, and are included in Appendix E. No design calculations or construction data are available, according to the Owner.

c. Operating Records. According to the Owner, no operating records are maintained.

d. Post Construction Changes. According to the Owner, no construction has taken place since the dam was completed in 1970.

e. Seismic Stability. The Sincavage Lumber Company Dam is located in Seismic Zone 1 according to the Seismic Zone Map of Contiguous States. A dam located in Seismic Zone 1 will generally be stable under expected Zone 1 earthequake conditions if it is stable under static loading conditions. Visual inspection of the dam indicated that some slope instability exists for the static condition; therefore, it is doubtful whether the embankment would be stable for seismic conditions.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation. Visual inspection of the Sincavage Lumber Company Dam indicates that the dam is in poor overall condition. Several deficiencies have been identified and are discussed in Section 3. A few of the conditions, particularly those concerning seepage, slope failures, and possible dam movement, require further investigation. Most of the remaining deficiencies have resulted from lack of periodic operation and maintenance and can be corrected by the Owner. It is important that all of the deficiences be corrected in a timely manner to help ensure the safety of the dam.

The selected SDF for Sincavage Lumber Company Dam is one-half of the PMF. The combined principal and emergency spillway system is capable of passing the SDF. The spillway is, therefore, classified as "Adequate".

b. Adequacy of Information. The information provided by the Pennsylvania DER, along with that obtained from the visual inspection and subsequent conversations with the Owner and his engineer, is considered adequate for a Phase I evaluation.

c. Urgency. The recommendations and remedial measures discussed in Section 7.2 should be implemented immediately.

d. Necessity of Further Information. Further investigations should be implemented as discussed in Section 7.2.

7.2 Recommendations and Remedial Measures

The recommendations and remedial measures should be initiated immediately.

a. Facilities

The Owner should retain the services of a licensed professional engineer, experienced in the design and construction of dams, to assist in the implementation of the following recommendations:

1. Detailed stability and seepage analyses of the embankment and foundation should be performed. In addition, the toe drains should be investigated to determine if they are functioning properly.

2. Access to the intake structure should be provided to facilitate routine and emergency operation of the low level gate.

3. The concrete outlet structure of the principal spillway should be repaired.

The Owner should initiate the following remedial measures:

1. Small trees and brush should be removed from the dam, particularly along the upstream face of the dam. The resulting voids should be backfilled with suitable compacted material. A cover of grass should be established in the affected areas.

2. Riprap along the upstream face of the dam should be replaced. The settled portion of the upstream face of the dam, just above the riprap, should be filled, regraded and reseeded.

3. Boulders present on the downstream face of the dam should be removed. Also, sloughed or settled areas should be backfilled with suitable material, compacted and provided with a good cover of grass.

4. A good cover of grass, or other means of protection against erosion, should be provided on the emergency spillway. Additional protection should be provided on the south side of the emergency spillway discharge channel and also at the outlet of the principal spillway.

b. Operation and Maintenance Procedures

1. An operation and maintenance program should be developed and implemented. This program should include periodic operation of outlet works, routine maintenance tasks, and an annual technical inspection performed by a licensed professional engineer, experienced in the design and construction of dams.

2. A monitoring and downstream warning plan should be developed and implemented during periods of extreme rainfall to ensure that downstream residents and the appropriate agencies are notified in the case of impending dam failure.

APPENDIX A

INSPECTION CHECKLIST

CHECK LIST
VISUAL INSPECTION
PHASE I

Name Dam Sincavage Lumber Co Dam County Monroe State PA National NDI ID # PA 00878

Type of Dam Earth Embankment Hazard Category Significant

Date(s) Inspection 04/08/81 Weather Clear Temperature 72 degrees

Pool Elevation at Time of Inspection 1628.0 M.S.L. Tailwater at Time of Inspection ± 1611 M.S.L.

Inspection Personnel:

Lee DeHeer Len Beck Alan Hanscom

Lee DeHeer Recorder

Remarks:

Mr. William T. Sincavage, Sr. of the Sincavage Lumber Company was present during the inspection.

Sheet 1 Of 11

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	Not Applicable	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Not Applicable	
DRAINS	Not Applicable	
WATER PASSAGES	Not Applicable	
FOUNDATION	Not Applicable	

Sheet 2 of 11

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Not Applicable	
STRUCTURAL CRACKING	Not Applicable	
VERTICAL AND HORIZONTAL ALIGNMENT	Not Applicable	
MONOLITH JOINTS	Not Applicable	
CONSTRUCTION JOINTS	Not Applicable	

Sheet 3 of 11

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	An extensive area located to the southwest of the low level outlet headwall and just d/s of the toe is very wet and appears to be "creeping" downstream.	- An investigation should be performed to determine the cause of this condition.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Sloughing and erosion are present at localized areas over the entire dam and at the abatement areas. In particular, there is a large sloughed area located on the dam, approximately 20 feet southwest of the low level outlet. (Photo 9, Appendix C)	- Sloughed and eroded areas should be filled, regraded and reseeded, as required, to provide smooth and stable surfaces.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Dam crest is arched d/s, by design. There appears to be a long horizontal "bulge" located on the d/s dam face, near the southwestern dam abutment.	- An investigation should be performed to determine the cause of this condition.
RIPRAP FAILURES	Riprap is displaced at several locations along the upstream face of the dam.	- Replace and supplement existing riprap to prevent erosion and undermining of of u/s dam face.

Sheet 4 of 11

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MISCELLANEOUS	Several boulders were observed on the d/s face of the dam. (Photo 6 , Appendix C) Small trees and brush observed on dam. (Photo 2)	Presence of boulders may indicate their presence in embankment as well. Trees and brush should be removed.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The northeastern abutment area and junction between the spillway and the dam are badly eroded. (Photo 7, Appendix C)	Regrade and reseed.
ANY NOTICEABLE SEEPAGE	Seepage was observed approximately 100 feet d/s of the dam along an abandoned access road. Water could be pumped from the ground at this location. (Photo 10, Appendix C)	A seepage analysis should be performed to determine the extent and nature of the seepage.
STAFF GAGE AND RECORDER	None	
DRAINS	Two 6-inch diameter toe drains were observed at the outlet headwall for the low level outlet (See Photos 11 and 12 .) One gpm was discharging from around the northeastern side toe drain, but no flow was observed in the pipes themselves.	The toe drains should be checked to ensure that they are not plugged.

Sheet 5 of 11

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	The outlet conduit is corrugated metal pipe.	
INTAKE STRUCTURE	No access to the intake structure is available. From the dam, a concrete drop intake structure with a trash rack was observed. (Photo 1, Appendix C)	Access should be provided to clean the trash rack and to operate the low level gate.
OUTLET STRUCTURE	The concrete outlet headwall is cracked badly at the wing walls where the toe drain pipes emerge (Photos 11 and 12, Appendix C)	Repair concrete headwall
OUTLET CHANNEL	The outlet channel is rough, ill defined, and has no riprap protection. Side slopes have eroded.	Channel base should be regraded. Riprap protection should be provided at the outlet. Side slopes should be reseeded.
EMERGENCY GATE	There is a low level intake gate at the intake structure. To operate the gate, it is necessary to gain access by boat and to use a gate stem operator.	Provide access to emergency gate.

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Not Applicable	
APPROACH CHANNEL	A 75-foot wide approach channel is located at the northeastern side abutment. There is little grass cover. (Photo 7, Appendix C)	A good grass cover should be provided.
DISCHARGE CHANNEL	The spillway discharge channel parallels the northeastern side groin area. It is also 75 feet wide and has little grass cover. (Photo 8, Appendix C)	A good grass cover should be provided.
BRIDGE AND PIERS	Not Applicable	

Sheet 7 of 11

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not Applicable	
APPROACH CHANNEL	Not Applicable	
DISCHARGE CHANNEL	Not Applicable	
BRIDGE AND PIERS	Not Applicable	
GATES AND OPERATION EQUIPMENT	Not Applicable	

Sheet 8 of 11

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	Not Applicable	
OBSERVATION WELLS	Not Applicable	
WEIRS	Not Applicable	
PIEZOMETERS	Not Applicable	
OTHER	Not Applicable	

Sheet 9 of 11

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The lake slopes appear to be stable and well-vegetated with both coniferous and deciduous trees.	
SEDIMENTATION	No evidence of significant sedimentation was observed. The primary cause of concern is with erosion at the spillway approach channel. (Photo 7)	

Sheet 10 of 11

DOWNSTREAM CHANNEL

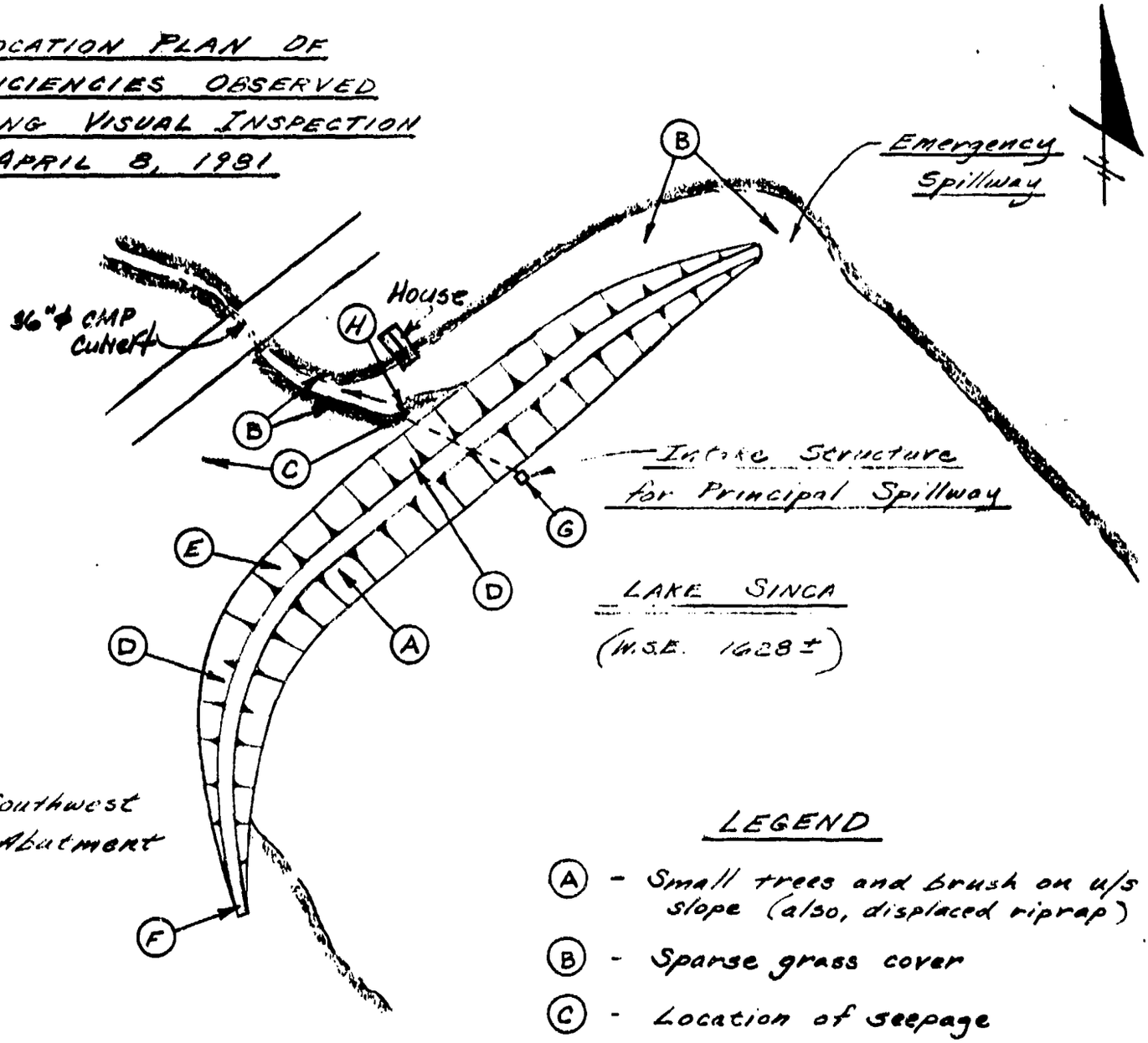
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Channel is particularly rough just d/s of the dam. Little debris or other obstructions were noted.	Rough areas should be regraded and reseeded.
SLOPES	Side slopes are eroded and rough in several places.	Slopes should be provided with riprap protection at low level outlet and a good grass cover further downstream.
APPROXIMATE NO. OF HOMES AND POPULATION	The hazard area lies just d/s of the dam where one home is located adjacent to the spillway channel. (Photo 14, Appendix C)	

Sheet 11 of 11

O'BRIEN & GERE ENGINEERS, INC.

SUBJECT	SHEET	BY	DATE	JOB NO
Sincavage Lumber Company Dam	11A	WPH	6-08-81	1841.014

LOCATION PLAN OF DEFICIENCIES OBSERVED DURING VISUAL INSPECTION APRIL 8, 1981



Approx. Scale: 1" = 200'

LEGEND

(A) - Small trees and brush on u/s slope (also, displaced riprap)

(B) - Sparse grass cover

(C) - Location of seepage

(D) - Sloughing of embankment

(E) - Large stones on d/s face

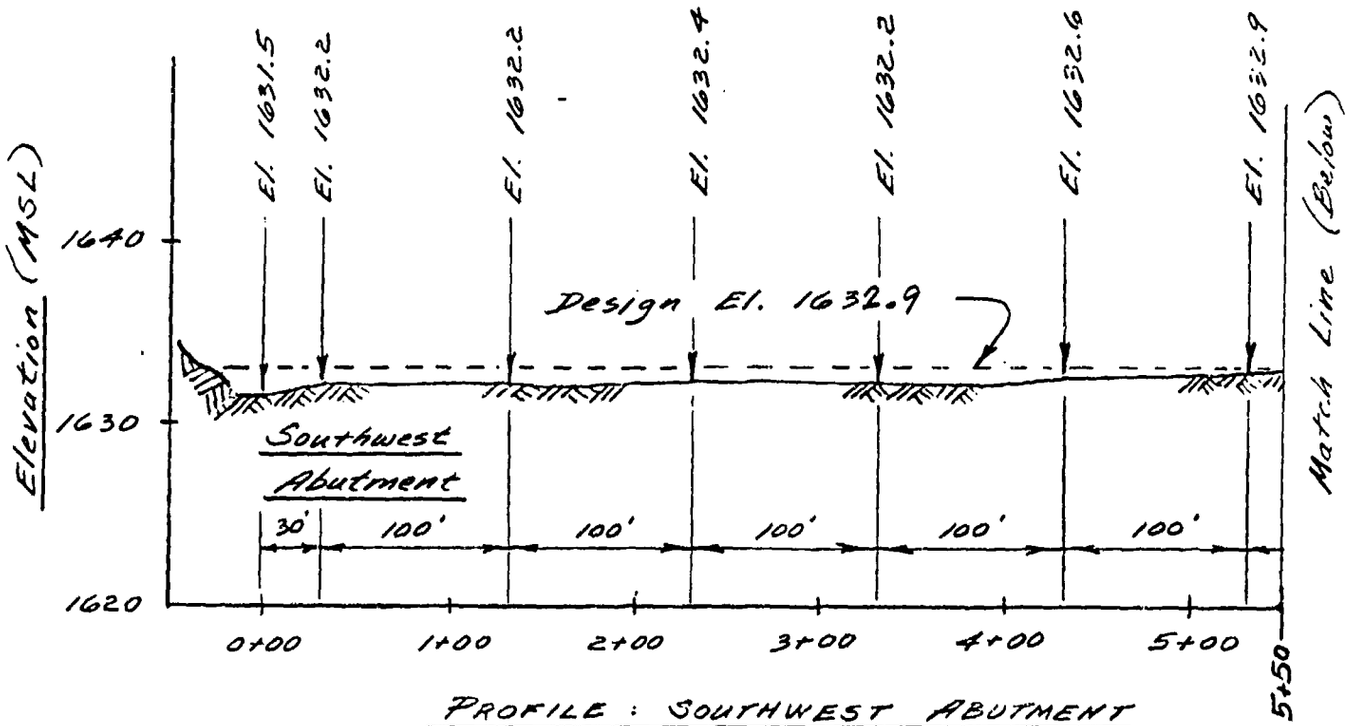
(F) - Top of dam el. below design elev. for most of dam

(G) - No access to intake structure

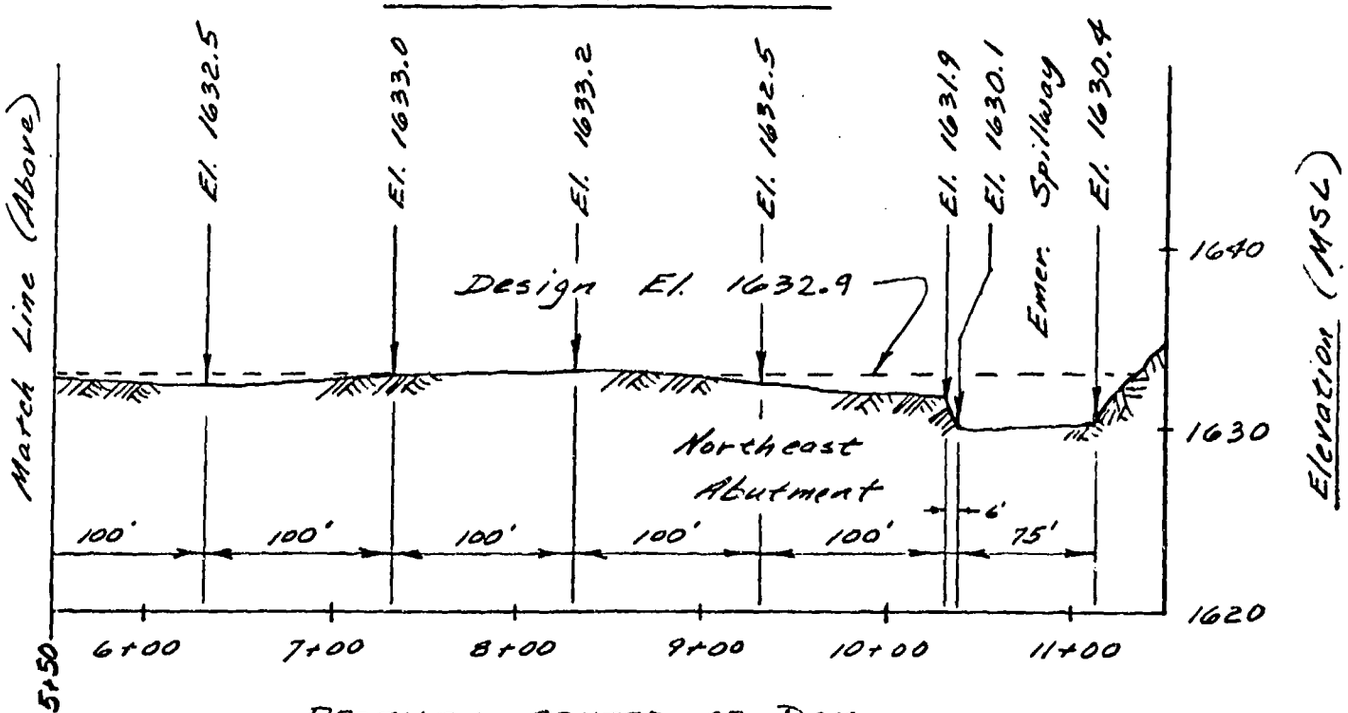
(H) - Cracking of outlet headwall

O'BRIEN & GERE ENGINEERS, INC.

SUBJECT	SHEET	BY	DATE	JOB NO
Profile: Sincavage Lumber Co. Dam	11B	ADH	5-28-81	1841.014



PROFILE : SOUTHWEST ABUTMENT TO CENTER OF DAM



PROFILE : CENTER OF DAM TO NORTHEAST ABUTMENT

Scales:
Hor. 1" = 100'
Vert. 1" = 10'

APPENDIX B

CHECKLIST
ENGINEERING DATA

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Sincavage Lumber Company Dam

NDI ID # PA 00878

ITEM	REMARKS
AS-BUILT DRAWINGS	None were prepared.
REGIONAL VICINITY MAP	See Figure 1, Appendix E.
CONSTRUCTION HISTORY	The dam was constructed by the Owner in 1969 after several years of design and review. No construction has taken place since that time.
TYPICAL SECTIONS OF DAM	See sheet 1, Appendix E, for maximum section.
OUTLETS - PLAN DETAILS CONSTRAINTS	See sheets 1 and 2, Appendix E.
DISCHARGE RATINGS	None available
RAINFALL/RESERVOIR RECORDS	None available

Sheet 1 of 4

ITEM	REMARKS
DESIGN REPORTS	Design notes are available at Edward C. Hess Associates.
GEOLOGY REPORTS	None available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	See design notes at Hess Associates for computations and H & H information. No dam stability or seepage analyses have been prepared, according to the Owner.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Test pits were dug, as indicated on the design drawings. A field memo is believed to be available at Hess Associates.
POST-CONSTRUCTION SURVEYS OF DAM	None
BORROW SOURCES	From current lake bottom. According to the Owner, the material was a gravelly clay.

Sheet 2 of 4

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	None since original construction.
HIGH POOL RECORDS	None available. According to the Owner, the water level fluctuates by only a few inches.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	None kept

Sheet 3 of 4

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	See design drawings in Appendix E.
OPERATING EQUIPMENT PLANS & DETAILS	None available
MISCELLANEOUS	Refer to Section 2.

Note: Information presented on this checklist was obtained from Mr. John Dennis of Edward C. Hess Associates and Mr. William T. Sincavage, Sr. of the Sincavage Lumber Company.

Sheet 4 of 4

APPENDIX C

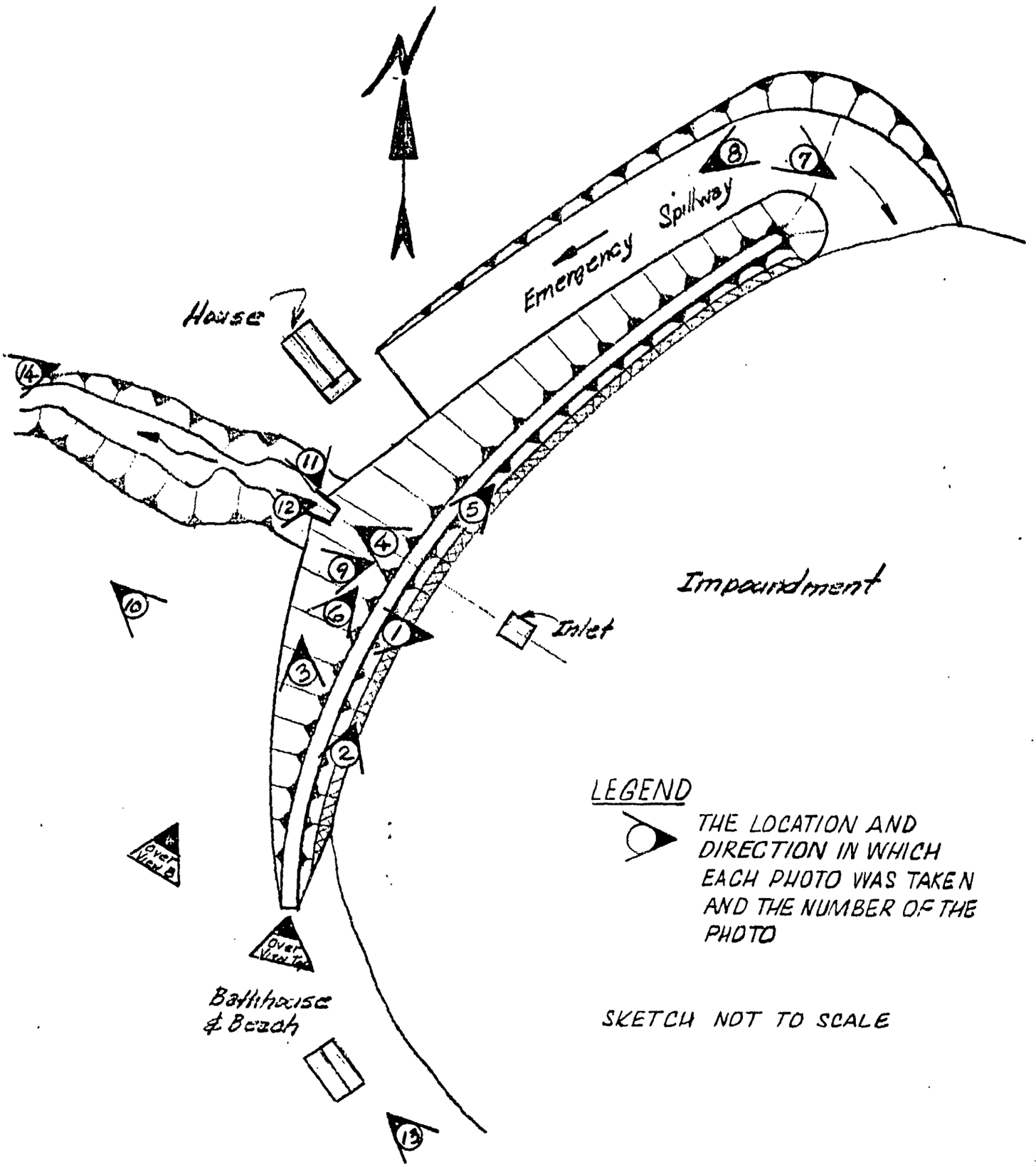
PHOTOGRAPHS

APPENDIX C
PHOTOGRAPH TABLE OF CONTENTS

		Page No.
Site Plan		A
PHOTOGRAPH No.		
1.	Overview of the impoundment showing the principal spillway inlet. (4/8/81)	1
2.	Upstream face of the embankment showing random riprap and brush cover. (4/8/81)	1
3.	Downstream face of the embankment and house built in emergency spillway outlet channel. (4/8/81)	2
4.	Downstream conditions as observed from the top of the dam. (4/8/81)	2
5.	Typical depression in the upstream face of the dam. (4/8/81)	3
6.	Typical oversize material in the embankment. (4/8/81)	3
7.	Emergency spillway channel looking upstream. (4/8/81)	4
8.	Emergency spillway channel looking downstream showing the house in the path of flow. (4/8/81)	4
9.	Slope failure in the downstream face of the dam. (4/8/81)	5
10.	Typical soft condition within 100 feet downstream of the dam. (4/8/81)	5
11.	Principal spillway outlet structure. (4/8/81)	6
12.	Close-up of principal spillway outlet structure showing cracked and honeycombed concrete. (4/8/81)	6
13.	Recreation development on the shores of the impoundment. (4/8/81)	7
14.	Hazard area and downstream channel with the dam in the background. (4/8/81)	7

O'BRIEN & GERE
ENGINEERS, INC.

SUBJECT	SHEET	BY	DATE	JOB NO
Sincavage Development Co. Lake Dam	A	JC	5/26/81	1841-014

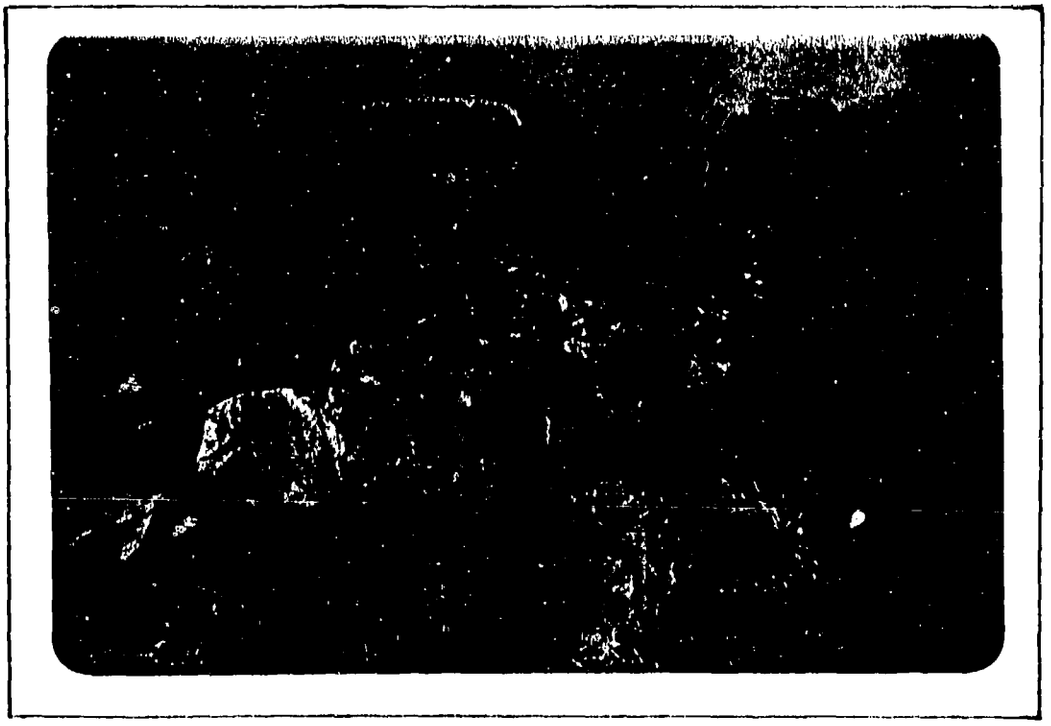


LEGEND

THE LOCATION AND DIRECTION IN WHICH EACH PHOTO WAS TAKEN AND THE NUMBER OF THE PHOTO

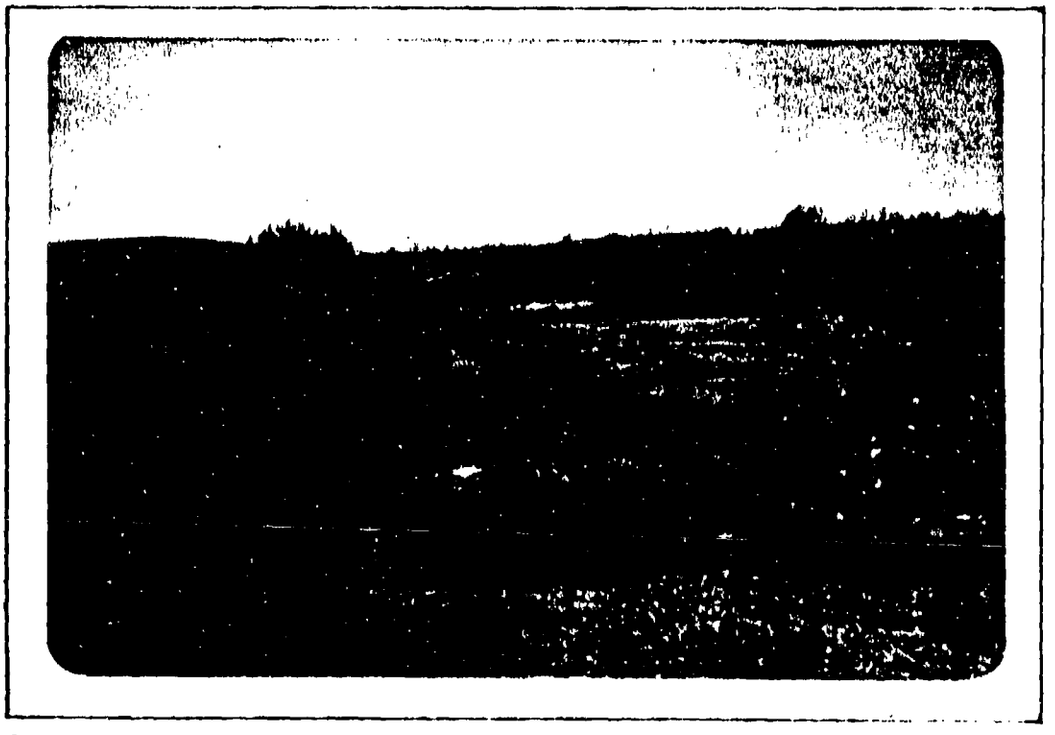
SKETCH NOT TO SCALE

1. OVERVIEW OF THE IMPOUNDMENT SHOWING THE PRINCIPAL SPILLWAY INLET. (4/8/81)

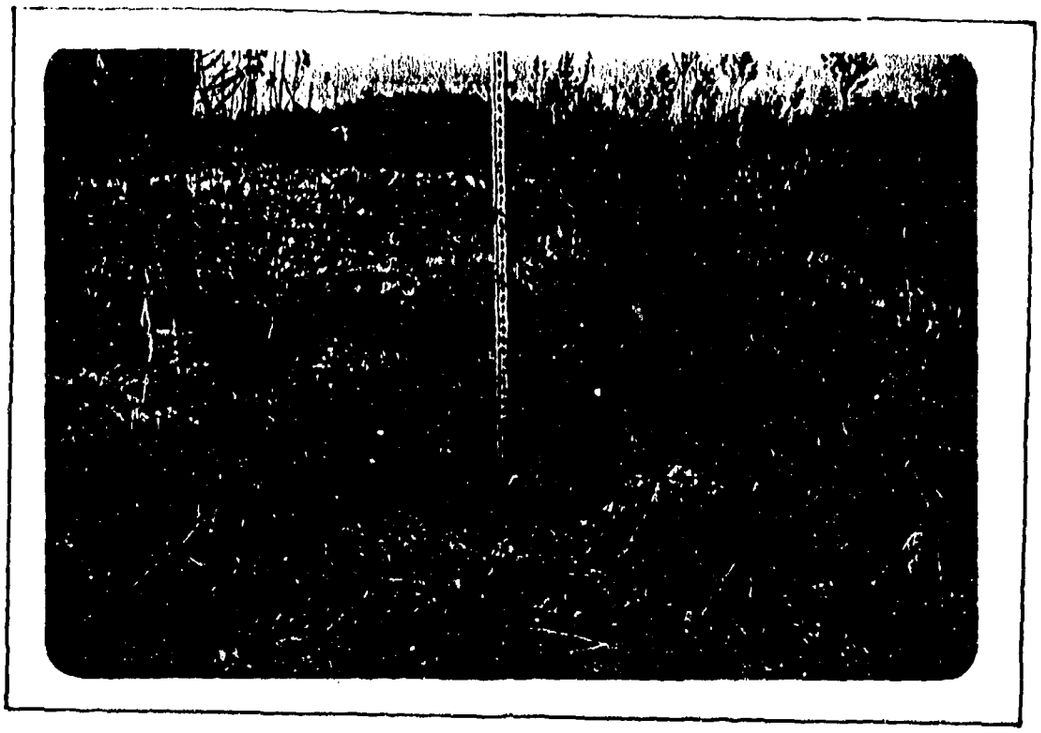


2. UPSTREAM FACE OF THE EMBANKMENT SHOWING RANDOM RIPRAP AND BRUSH COVER. (4/8/81)

3. DOWNSTREAM FACE OF THE EMBANKMENT AND HOUSE BUILT IN EMERGENCY SPILLWAY OUTLET CHANNEL. (4/8/81)

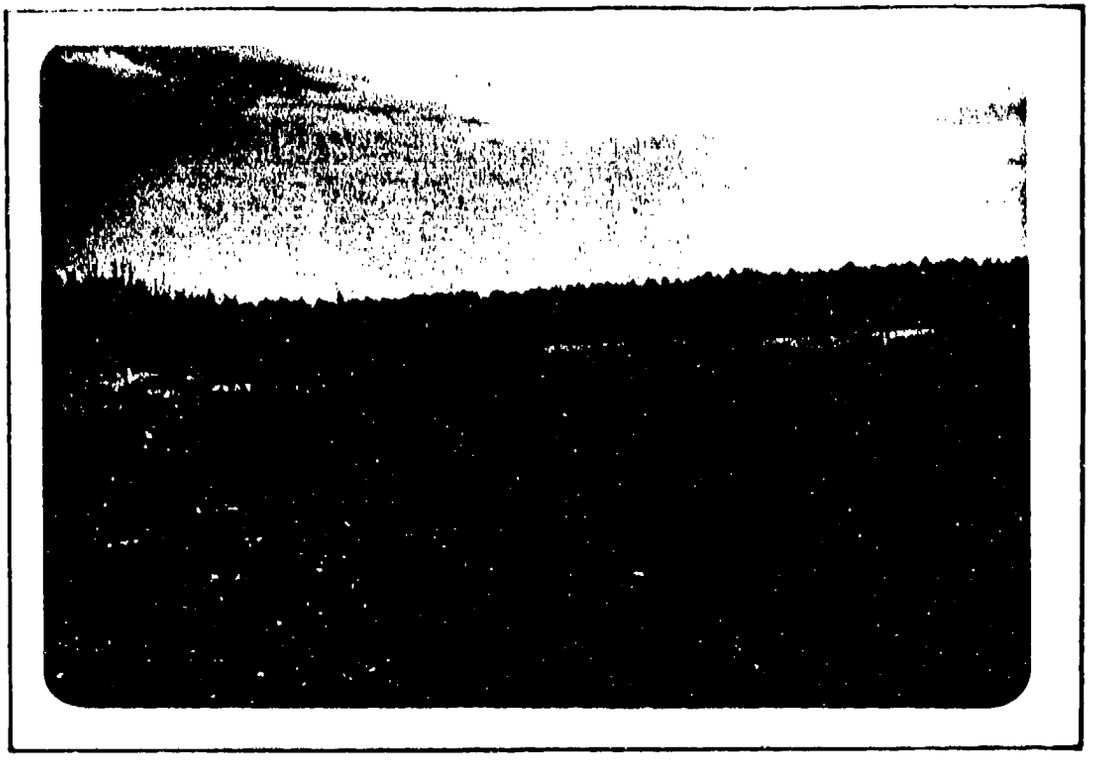


4. DOWNSTREAM CONDITIONS AS OBSERVED FROM THE TOP OF THE DAM. (4/8/81)

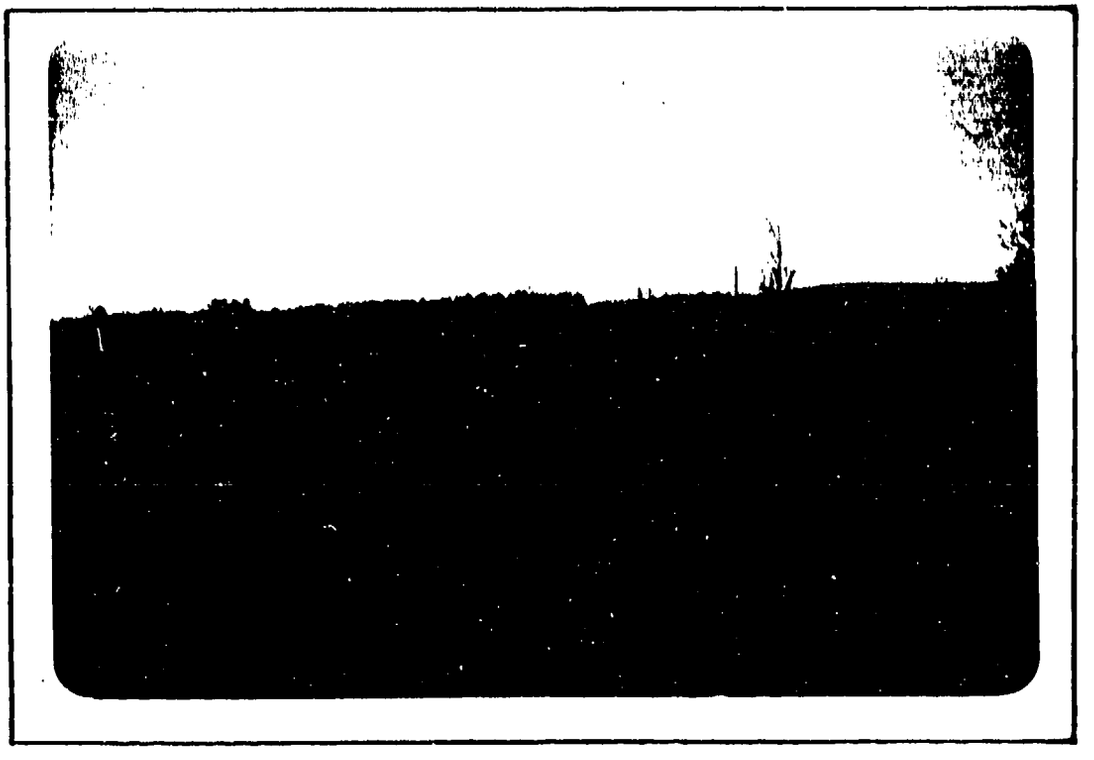


5. TYPICAL DEPRESSION IN THE UPSTREAM FACE OF THE DAM. (4/8/81)

6. TYPICAL OVERSIZE MATERIAL IN THE EMBANKMENT. (4/8/81)



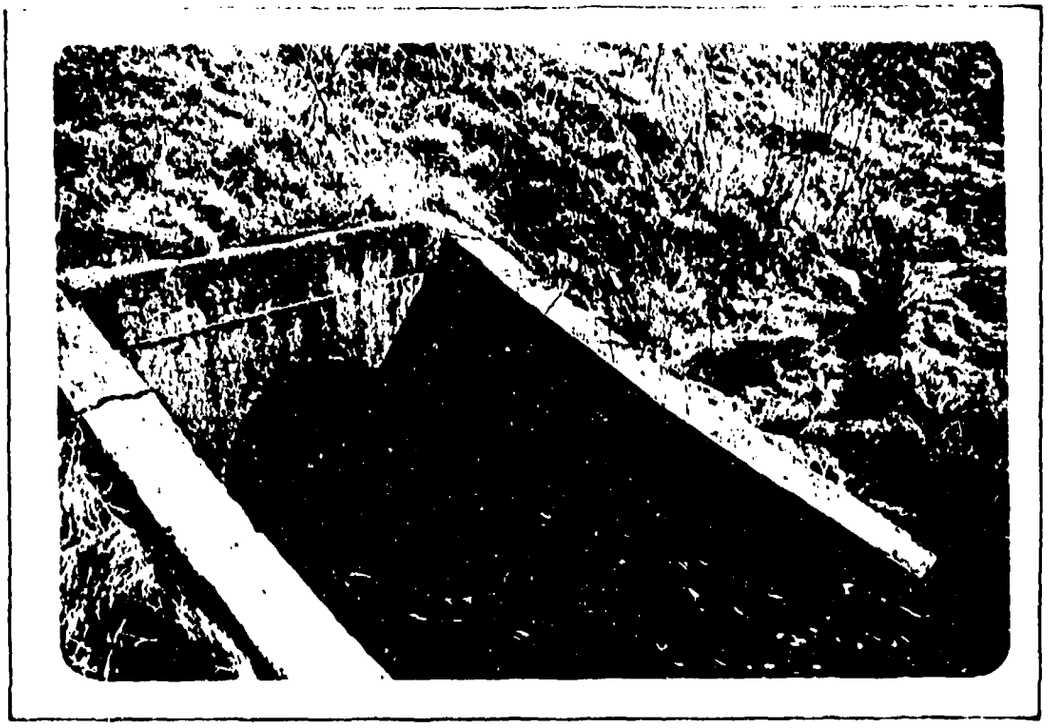
7. EMERGENCY SPILLWAY CHANNEL LOOKING UPSTREAM. (4/8/81)



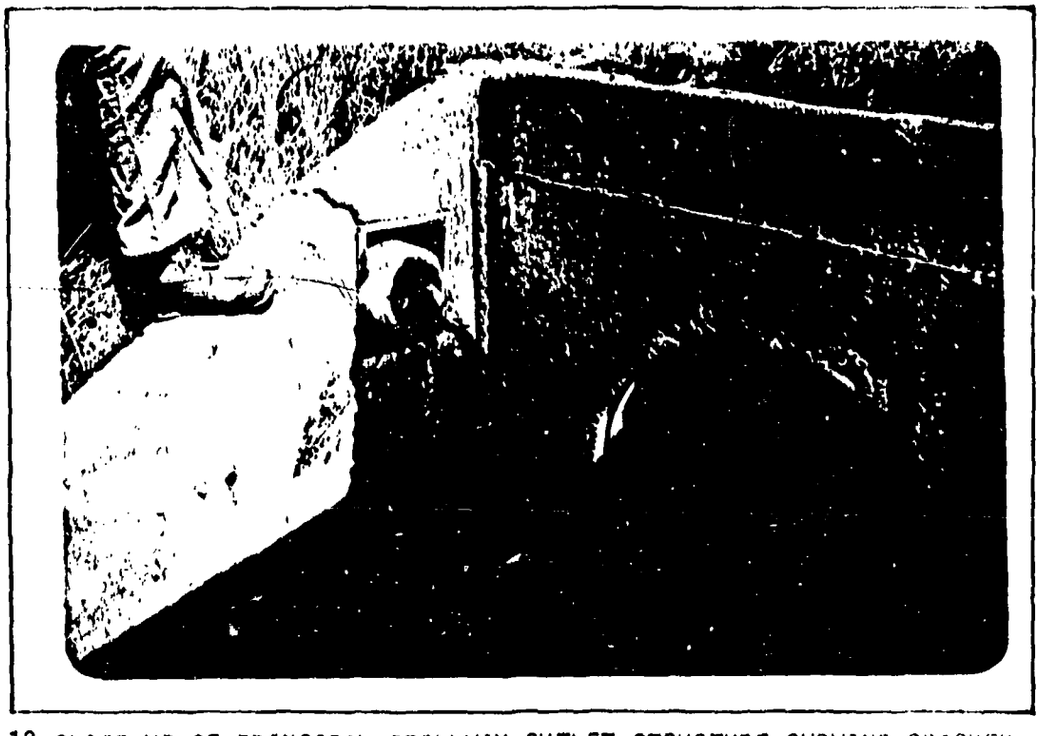
8. EMERGENCY SPILLWAY CHANNEL LOOKING DOWNSTREAM SHOWING THE HOUSE IN THE PATH OF FLOW. (4/8/81)

9. SLOPE FAILURE IN THE DOWNSTREAM FACE OF THE DAM. (4/8/81)

10. TYPICAL SOFT CONDITION WITHIN 100 FEET DOWNSTREAM OF THE DAM. (4/8/81)



11. PRINCIPAL SPILLWAY OUTLET STRUCTURE. (4/8/81)



12. CLOSE-UP OF PRINCIPAL SPILLWAY OUTLET STRUCTURE SHOWING CRACKED AND HONEYCOMBED CONCRETE. (4/8/81)

13. RECREATION DEVELOPMENT ON THE SHORES OF THE IMPOUNDMENT. (4/8/81)

14. HAZARD AREA AND DOWNSTREAM CHANNEL WITH THE DAM IN THE BACK-GROUND. (4/8/81)

APPENDIX D

HYDROLOGIC AND HYDRAULIC ENGINEERING DATA

SINCAVAGE LUMBER COMPANY DAM

APPENDIX D

HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

TABLE OF CONTENTS

	Sheet
Check List, Hydrologic and Hydraulic Engineering Data	1
HEC-1, Revised Flood Hydrograph Package	2
Drainage Area, Surface Areas, PMP Calculations and Tp Calculation	3
Stage - Discharge Calculations & Table	4
Stage - Discharge Curve	5
HEC-1 Dam Safety Version, Non-Breach Computer Output	6 through 9

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 50% residential, 50% swampy, primarily forested

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): El. 1628 (132 Acre - feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): El. 1630.2 (185 Acre - feet)

ELEVATION MAXIMUM DESIGN POOL: El. 1632.9

ELEVATION TOP DAM: El. 1631.5, Low Point Top of Dam

SPILLWAY (Emergency)

a. Elevation 1630.2

b. Type Open channel chute spillway

c. Width NA

d. Length 75 feet

e. Location Spillover Northeastern Abutment

f. Number and Type of Gates None

OUTLET WORKS: (Primary Spillway & Outlet Works)

a. Type 4 foot sq. drop inlet, with 30-inch diameter CMP outlet pipe

b. Location Center of dam

c. Entrance inverts 1610.5 (design)

d. Exit inverts 1609.56 (design)

e. Emergency draindown facilities 18" sq. sluice gate at intake structure

HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location NA

c. Records NA

MAXIMUM NON-DAMAGING DISCHARGE: Not determined

HEC-1, REVISED
FLOOD HYDROGRAPH PACKAGE

The original "Flood Hydrograph Package" (HEC-1), developed by the Hydrologic Engineering Center, Corps of Engineers, has been modified for use under the National Dam Inspection Program. The "Flood Hydrograph Package (HEC-1), Dam Safety Version", hereinafter referred to as, HEC-1, Rev., has been modified to require less detailed input and to include a dam breach analysis. The required input is obtained from the field inspection of a dam, any available design/evaluation data, relatively simple hydraulic calculations, or information from the USGS Quandrangle maps. The input format is flexible in order to reflect any unique characteristics of an individual dam.

HEC-1, Rev. computes a reservoir inflow hydrograph based on individual watershed characteristics such as: area, percentage of impervious surface area, watershed shape, and hydrograph characteristics determined from regional correlation studies by the Corps of Engineers, Baltimore District. The inflow is routed through the reservoir using spillway discharge data obtained from the field inspection or design data. Flood storage capacity is determined from USGS maps or design information and verified by the field inspection. In the event a spillway cannot discharge 0.5 PMF without overtopping and failure of the dam, downstream channel characteristics obtained from the field inspection and USGS maps are inputed and flows are routed downstream to the damage center and a dam breach analysis is performed 1/

Included in this Appendix are the HEC-1, Rev. pertinent input values and a summary print-out.

1/ "High" hazard structures only

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
Sincavage Lumber Co. Dam	3	[illegible]	4/3/81	1841-014

Drainage Area = 0.45 mi² (Planimetered from USGS Quad sheet)

Surface Area of Lake

Elev.	Area (Acres)
1628	22
1630.2	26
1633	33

PMP Calculations (HMR 33)

Area is in Zone 6

24-hr, 200 mi² rainfall = 22.8"

Hr.	%	Rainfall (inches)	Δ Rainfall (inches)
6	113	25.8	25.8
12	123	28.0	2.2
24	132	30.1	2.1
48	142	32.4	2.3

Snyder Coefficients (Information provided by Balt. COE)

Area is in Zone 2

$C_p = 0.45$, $L = 0.58$ mi, $L_{CA} = 0.50$ mi

$C_t = 2.10$

$t_p = 2.1 (L \cdot L_{CA})^{0.3}$

$t_p = 2.1 (0.58 \times 0.5)^{0.3}$

$t_p = 1.45$ hr.

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
Sincavage Lumber Co. Dam	4	ADH	6-02-81	1841.014

Stage - Discharge Calculations: (Scobe, Design Pg 22-03)

Hazen & Williams formula for flow in pipes

1.) Flow through 30-inch diameter primary outlet → $Q_o = 1.318\, C_H\, A\, R^{0.63}\, S^{0.54}$; where $C_H = 77$ for 30-inch CMP & length of outlet ≈ 153 feet

2.) Flow over spillway → $Q_s = C L_s H_s^{3/2}$; where $C = 2.8$ for long, broad-crested weir & side slopes of spillway are 3H:1V

Stage - Discharge Table:

Elev. (MSL)	H_o (feet)	Q_o (cfs)	H_s (feet)	L_s (feet)	Q_s (cfs)	Q_{total} (cfs)
1628	18.5	0	—	—	—	0
1629	19.5	96	—	—	—	96
1630	20.5	99	—	—	—	99
1630.2	20.7	100	0	0	0	100
1631	21.5	102	0.8	77.4	155	257
1631.5	22.0	103	1.3	78.9	327	430
1633*	23.5	106	2.8	83.4	1,094	1,200
1635	25.5	≈110	4.8	89.4	≈2630	≈2,740

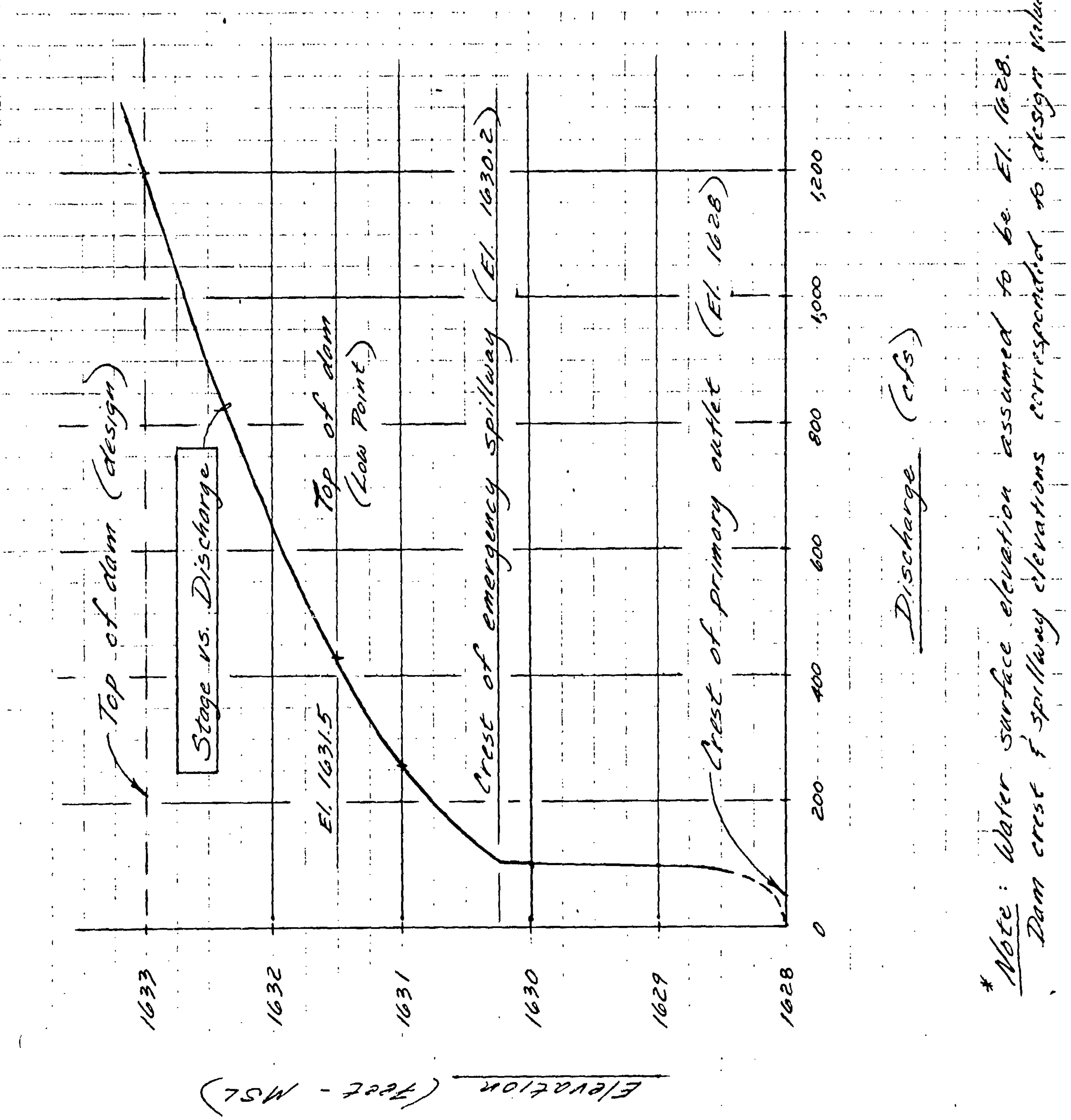
Note the following elevations:

Crest of primary outlet → El. 1628.0
Crest of emergency spillway → El. 1630.2
Top of Dam (Low Point) → El. 1631.5
Top of Dam (Design) → El. 1632.9

* Assuming dam was raised to El. 1633.0
Reservoir Drain Discharge $Q = CA\sqrt{2gH}$, $C = 0.6$, $A = 1.77\ ft^2$ (18" ϕ)
$Q = 0.6 \times 1.77 \times 8.025 \times 4.05 \approx 34.5$ cfs $H_{max} = 16.25'$ (ϕ pipe)

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
Sincavage Lumber Company Dam	5	ADH	6-02-81	1841.014



```
1**********
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  01 APR 80
 **********
     1              A1
     2              A2                                NATIONAL DAM INSPECTION PROGRAM
     3              A3                                 BALTIMORE CORPS OF ENGINEERS
     4              B    300       0      10       0       0       0       0       0      -4       0
     5              B1     5
     6              J      1       9       1
     7              J1    .1      .2      .3      .4      .5      .6      .7      .8     1.0
     8              K      0  INFLOW                                       1
     9              K1                                RUNOFF TO LAKE SINCA
    10              M      1       1     0.4
    11              P      0    22.8     113     123     132     142
    12              T                                                    1     .05
    13              W   1.45    0.45
    14              X   -1.5   -0.05       2
    15              K      1  OUTFLO                                       1
    16              K1                               OUTFLOW FROM LAKE SINCA
    17              Y                                       1       1
    18              Y1     1                                          -1628      -1
    19              Y4  1628    1629    1630  1630.2    1631  1631.5    1633
    20              Y5     0      96      99     100     257     430    1200
    21              $A     0      22      26      33
    22              $E  1610    1628  1630.2    1633
    23              $$  1628
    24              $D  1633  1/
    25              K     99
1                          PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                           RUNOFF HYDROGRAPH AT      INFLOW
                           ROUTE HYDROGRAPH TO       OUTFLO
                           END OF NETWORK
```

1/ The low pt. top of dam is El. 1631.5. El. 1633.0 is the design top of dam

NATIONAL DAM INSPECTION PROGRAM
BALTIMORE CORPS OF ENGINEERS
SINCAVAGE LUMBER COMPANY DAM (LAKE SINCA DAM)

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	10	0	0	0	0	0	-4	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= .10 .20 .30 .40 .50 .60 .70 .80 1.00

Sh 6

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

RUNOFF TO LAKE SINCA

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
INFLOW		0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.40	0.00	.40	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.80	113.00	123.00	132.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 1.45 CP= .45 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 78 END-OF-PERIOD ORDINATES, LAG= 1.46 HOURS, CP= .45 VOL= 1.00

3.	10.	21.	34.	48.	61.	72.	79.	82.	79.
74.	69.	64.	59.	55.	51.	48.	45.	41.	39.
36.	33.	31.	29.	27.	25.	23.	22.	20.	19.
17.	16.	15.	14.	13.	12.	11.	10.	10.	9.
8.	8.	7.	7.	6.	6.	5.	5.	5.	4.
4.	4.	4.	3.	3.	3.	3.	2.	2.	2.
2.	2.	2.	2.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.		

END-OF-PERIOD FLOW

0 MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	25.90	23.50	2.40	35673.
										(658.)	(597.)	(61.)	(1010.15)

Sh 7

HYDROGRAPH ROUTING

OUTFLOW FROM LAKE SINCA

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
OUTFLO	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1628.	-1

STAGE	1628.00	1629.00	1630.00	1630.20	1631.00	1631.50	1633.00
FLOW	0.00	96.00	99.00	100.00	257.00	430.00	1200.00
SURFACE AREA=	0.	22.	26.	33.			
CAPACITY=	0.	132.	185.	267.			
ELEVATION=	1610.	1628.	1630.	1633.			

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1628.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1633.0	0.0	0.0	0.

PEAK OUTFLOW IS 66. AT TIME 43.33 HOURS

PEAK OUTFLOW IS 98. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 161. AT TIME 43.83 HOURS

PEAK OUTFLOW IS 257. AT TIME 43.33 HOURS

PEAK OUTFLOW IS 372. AT TIME 42.83 HOURS

PEAK OUTFLOW IS 483. AT TIME 42.67 HOURS

PEAK OUTFLOW IS 591. AT TIME 42.33 HOURS

PEAK OUTFLOW IS 692. AT TIME 42.33 HOURS

PEAK OUTFLOW IS 886. AT TIME 42.17 HOURS

********** ********** ********** ********** **********

1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .10	RATIO 2 .20	RATIO 3 .30	RATIO 4 .40	RATIO 5 .50	RATIO 6 .60	RATIO 7 .70	RATIO 8 .80	RATIO 9 1.00
HYDROGRAPH AT	INFLOW	.40	1	100.	200.	300.	399.	499.	599.	699.	799.	999.
		(1.04)		(2.83)(	5.66)(	8.48)(	11.31)(	14.14)(	16.97)(	19.79)(	22.62)(	28.28)
ROUTED TO	OUTFLO	.40	1	66.	98.	161.	257.	372.	483.	591.	692.	886.
		(1.04)		(1.87)(	2.77)(	4.55)(	7.29)(	10.55)(	13.68)(	16.73)(	19.60)(	25.09)

1

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM [1]
ELEVATION	1628.00	1628.00	1633.00
STORAGE	132.	132.	267.
OUTFLOW	0.	0.	1200.

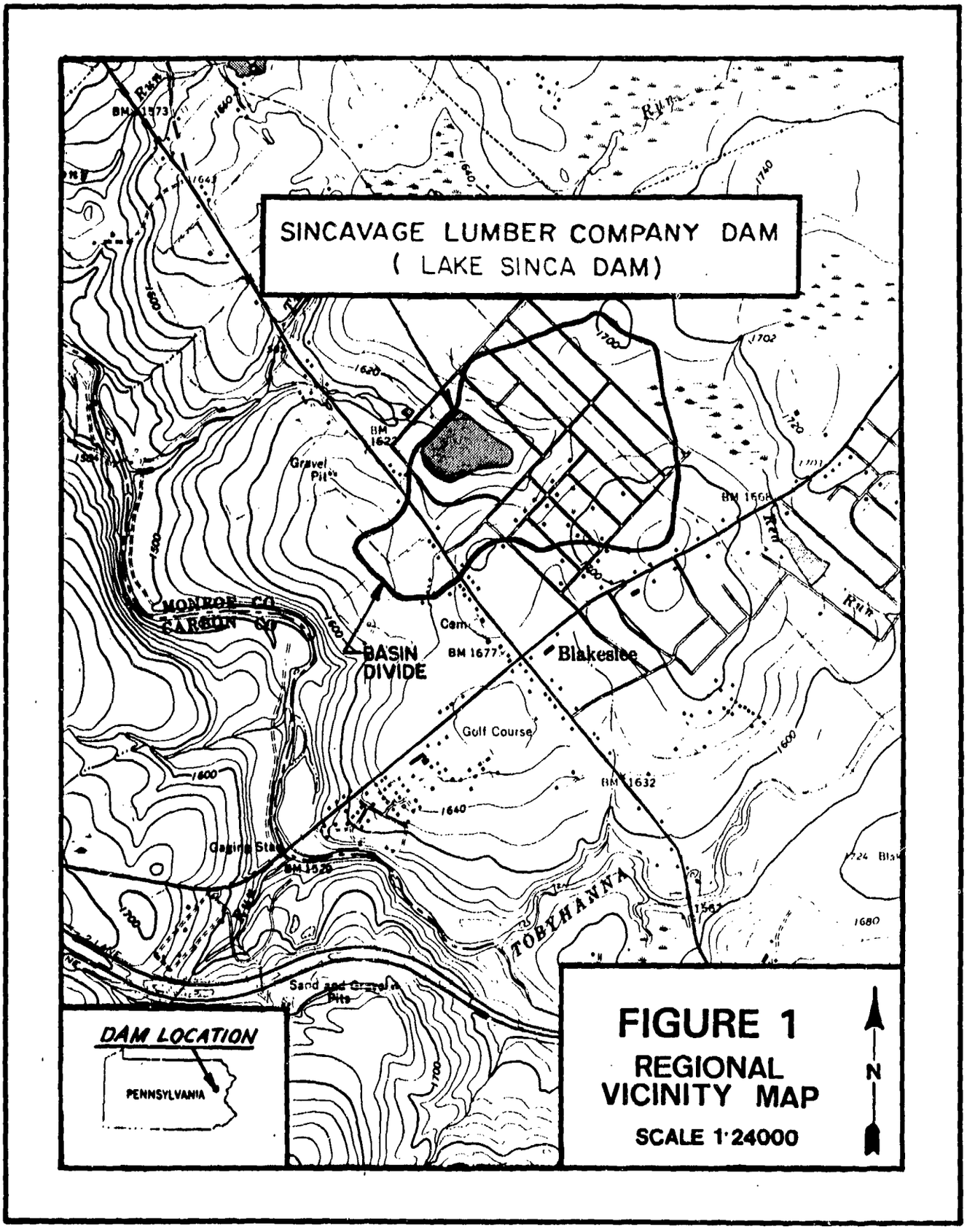
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1628.69	0.00	148.	66.	0.00	43.33	0.00
.20	1629.55	0.00	168.	98.	0.00	44.00	0.00
.30	1630.51	0.00	193.	161.	0.00	43.83	0.00
.40	1631.00	0.00	206.	257.	0.00	43.33	0.00
.50	1631.33	0.00	216.	372.	0.00	42.83	0.00
.60	1631.60	0.00	224.	483.	0.00	42.67	0.00
.70	1631.81	0.00	230.	591.	0.00	42.33	0.00
.80	1632.01	0.00	236.	692.	0.00	42.33	0.00
1.00	1632.39	0.00	247.	886.	0.00	42.17	0.00

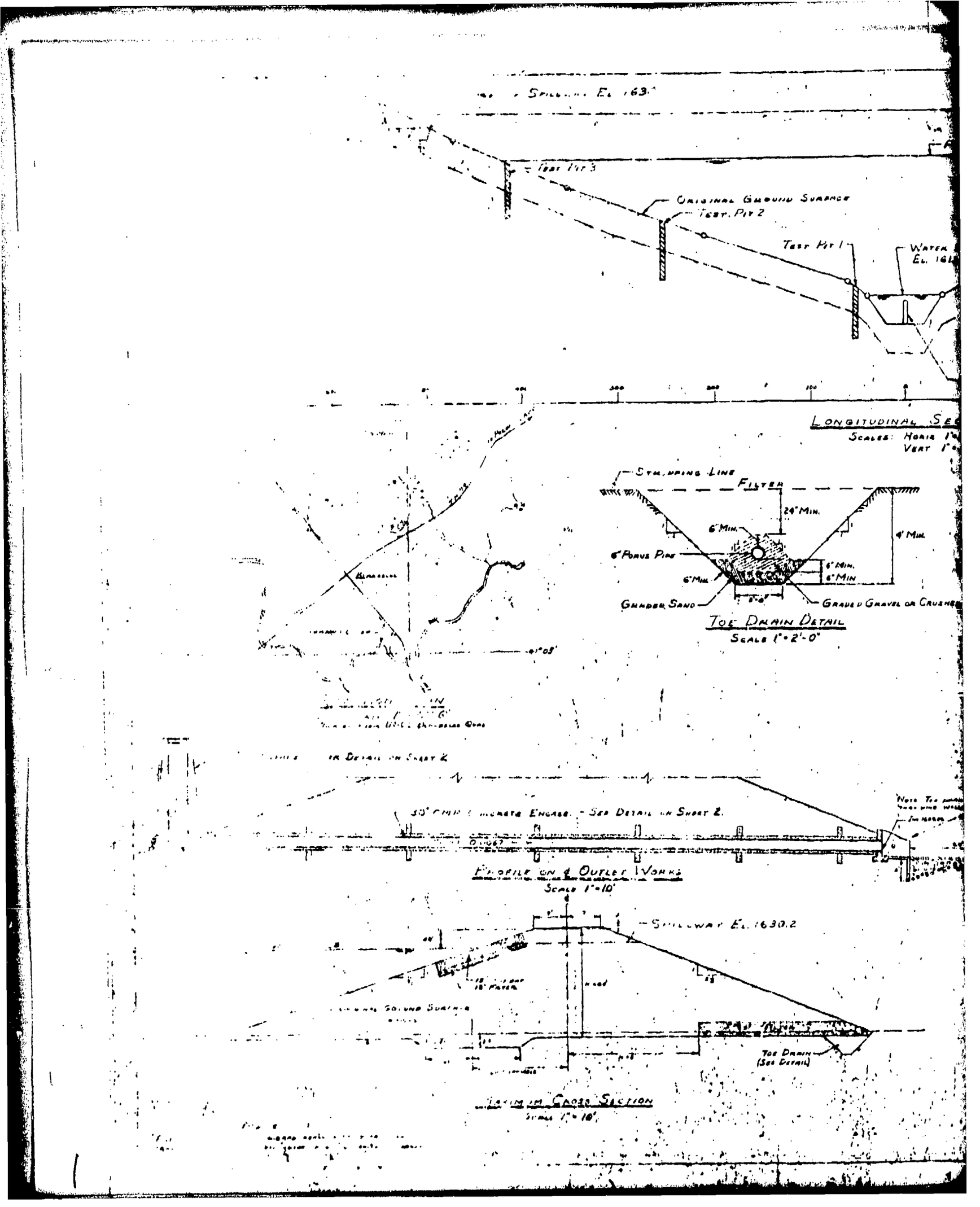
Sh 9

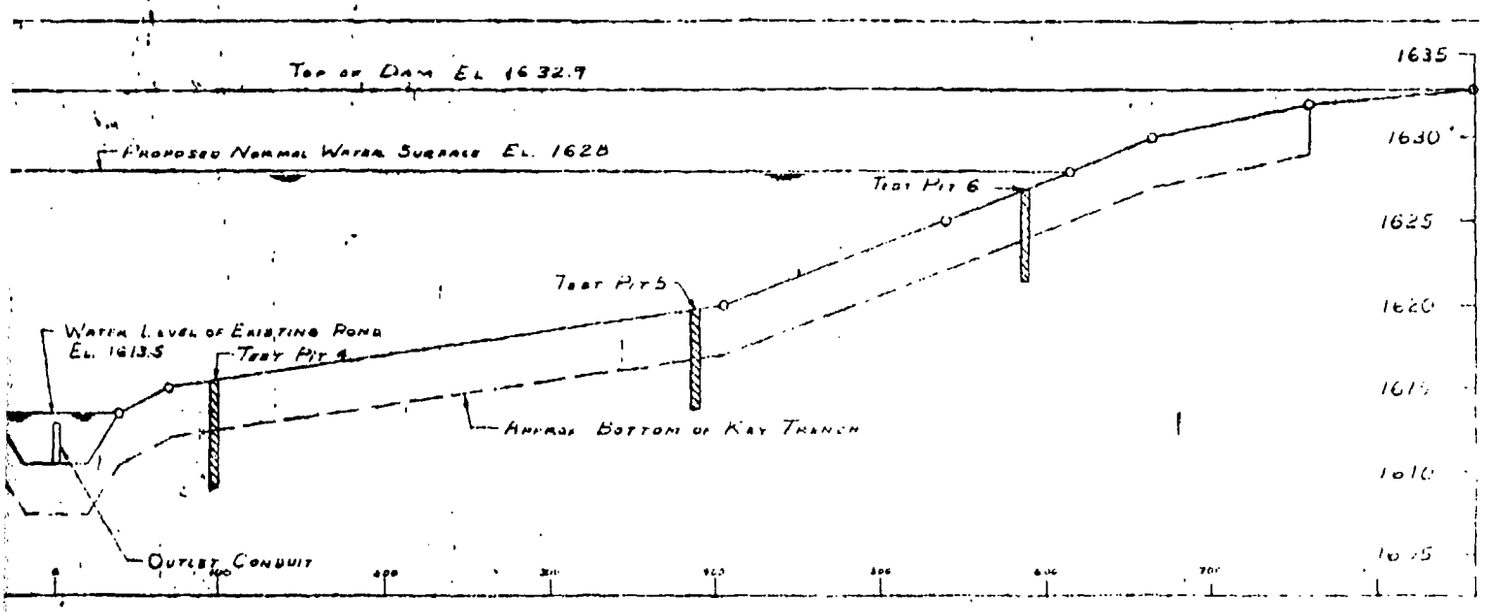
[1] The low point of the top of the dam is El. 1631.5. The design top of the dam is El. 1633.0.

APPENDIX E

REGIONAL VICINITY MAP
&
DRAWINGS

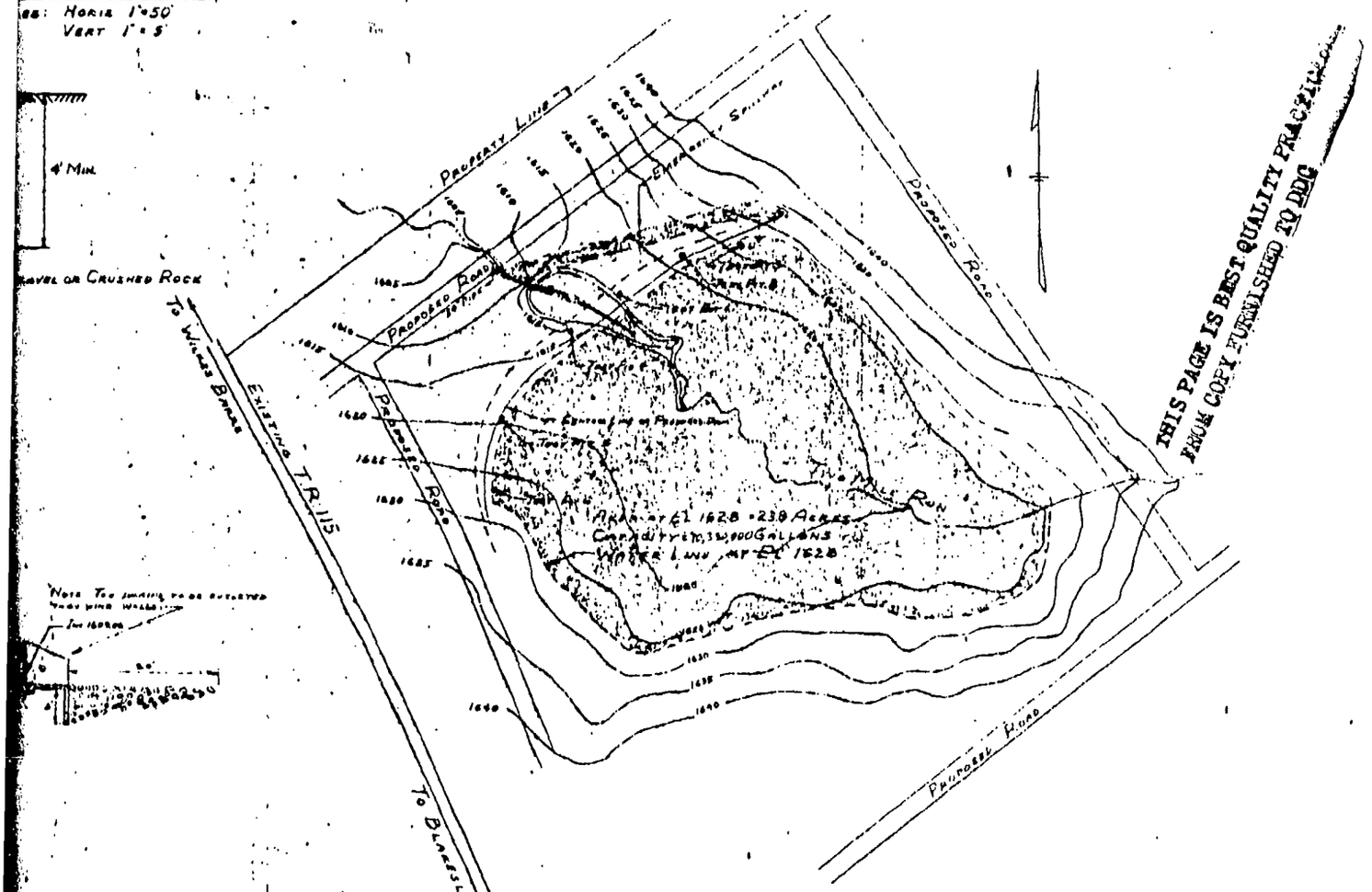

SINCAVAGE LUMBER COMPANY DAM
(LAKE SINCA DAM)
BM 1573
Gravel Pit
BM 1622
BM 1668
MONROE CO.
CARBON CO.
BASIN DIVIDE
BM 1677
Blakeslee
Golf Course
BM 1632
Gaging Sta.
BM 1525
TOBYHANNA
Sand and Gravel Pits
DAM LOCATION
PENNSYLVANIA
FIGURE 1
REGIONAL VICINITY MAP
SCALE 1:24000
N


Spillway El. 163.
Test Pit 3
Original Ground Surface
Test Pit 2
Test Pit 1
Water
El. 161
Longitudinal Se
Scales: Horiz 1"
Vert 1"
Stm. Spring Line
Filter
24" Min.
6" Min.
4' Min.
6" Porus Pipe
6" Min.
6" Min.
6" Min.
Grander Sand
Graded Gravel or Crushe
Toe Drain Detail
Scale 1"=2'-0"
See Detail on Sheet 2
30" CMP
See Detail on Sheet 2.
Profile on ℄ Outlet Works
Scale 1"=10'
Spillway El. 1630.2
Toe Drain
(See Detail)
Section
Scale 1"=10'



DINAL SECTION

ES: HORIZ 1"=50'
VERT 1"=5'

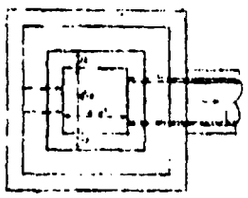


PLAN
Scale 1"=200'

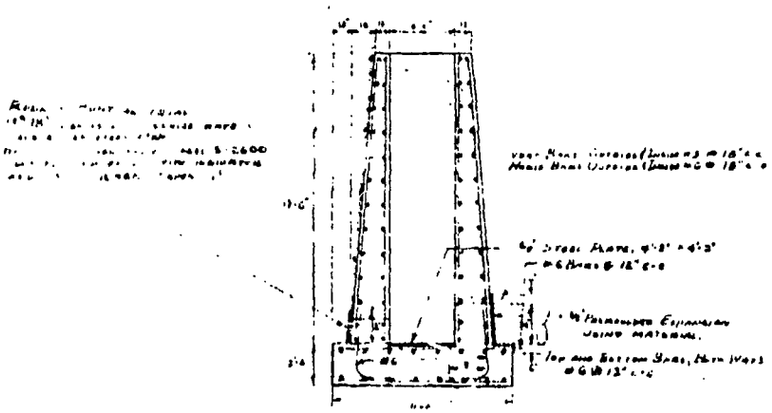
Note: Contours superimposed from Topographic Map of Pocono Court House Quad., Inc.

Revised Copy 8/27/68 Sept. 4, 1968 Oct. 4 1968

PLAN OF
PROPOSED
LAKE SINCA
AT
GREEN WOOD ACRES
TOBYHANNA TOWNSHIP, MONROE COUNTY, PA.
MARCH 1968. SCALE: AS SHOWN.
EDWARD C. HESS ASSOCIATES STROUDSBURG, PA.
SHEET 1 OF 2



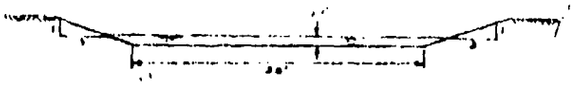
PLAN



SECTION

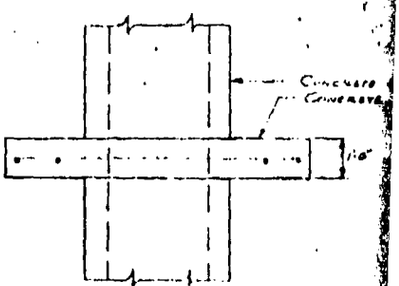
INTAKE TOWER

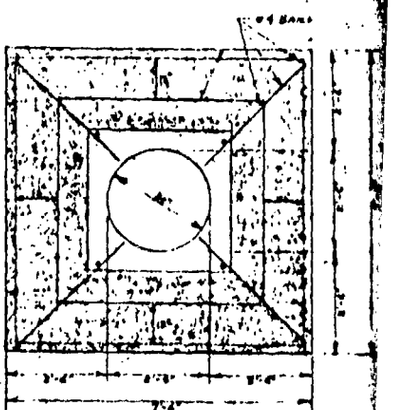
SCALE 1" = 5'



TYPICAL SPILLWAY SECTION

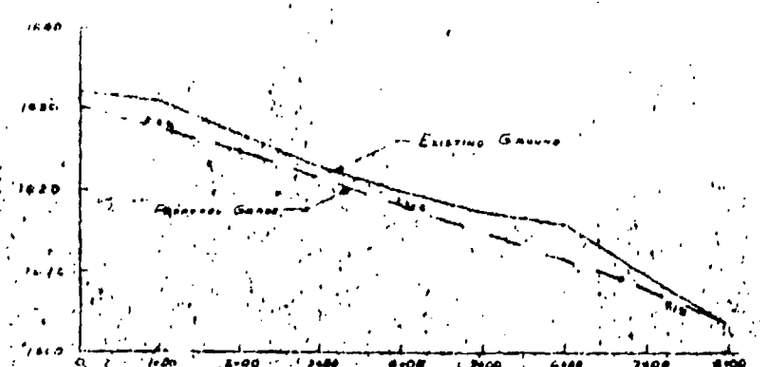
SCALE 1" = 10'





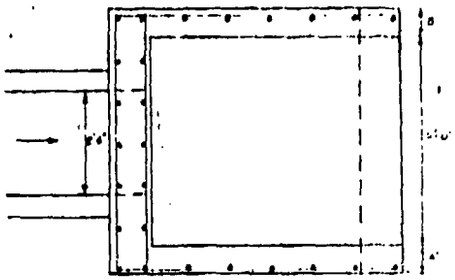
CONCRETE COLLAR DET

SCALE 1" = 2'-0"

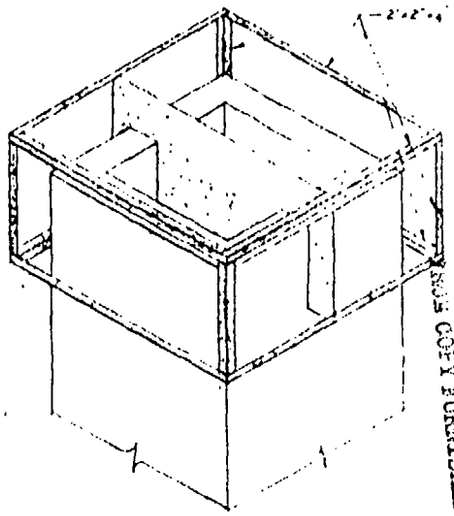


PROFILE OF EMERGENCY SPILLWAY

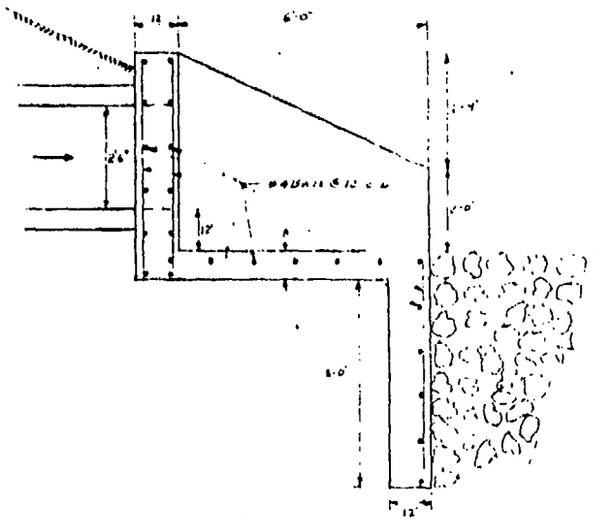
SCALES H. 1" = 100'
V. 1" = 10'



PLAN



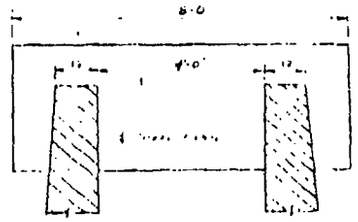
ISOMETRIC VIEW



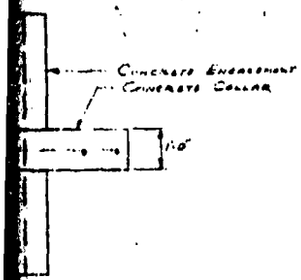
SECTION

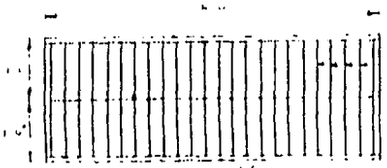
OUTLET STRUCTURE

Scale 1" = 2'-0"

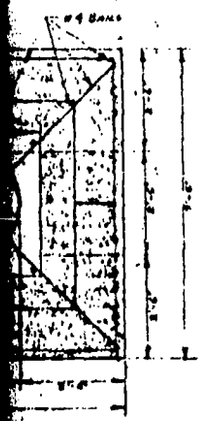


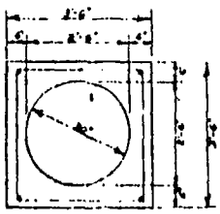
DEBRIS RACK





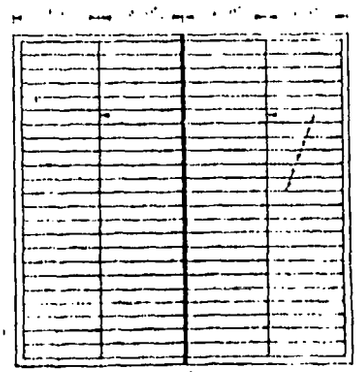
SIDE VIEW





CONCRETE ENCASEMENT DETAIL

SCALE 1" = 2'-0"



TOP VIEW

TRASH RACK AND VORTEX DEVICE

SCALE 1" = 2'-0"

COLLAR DETAILS

SCALE 1" = 2'-0"

PLAN OF
PROPOSED
LAKE SINCA
AT
GREEN WOOD ACRES
TOBYHANNA TOWNSHIP, MONROE COUNTY, PA
SCALE: AS SHOWN
EDWARD C. HESS ASSOCIATES STROUDSBURG, PA
SHEET 2 OF 2

APPENDIX F

GEOLOGY

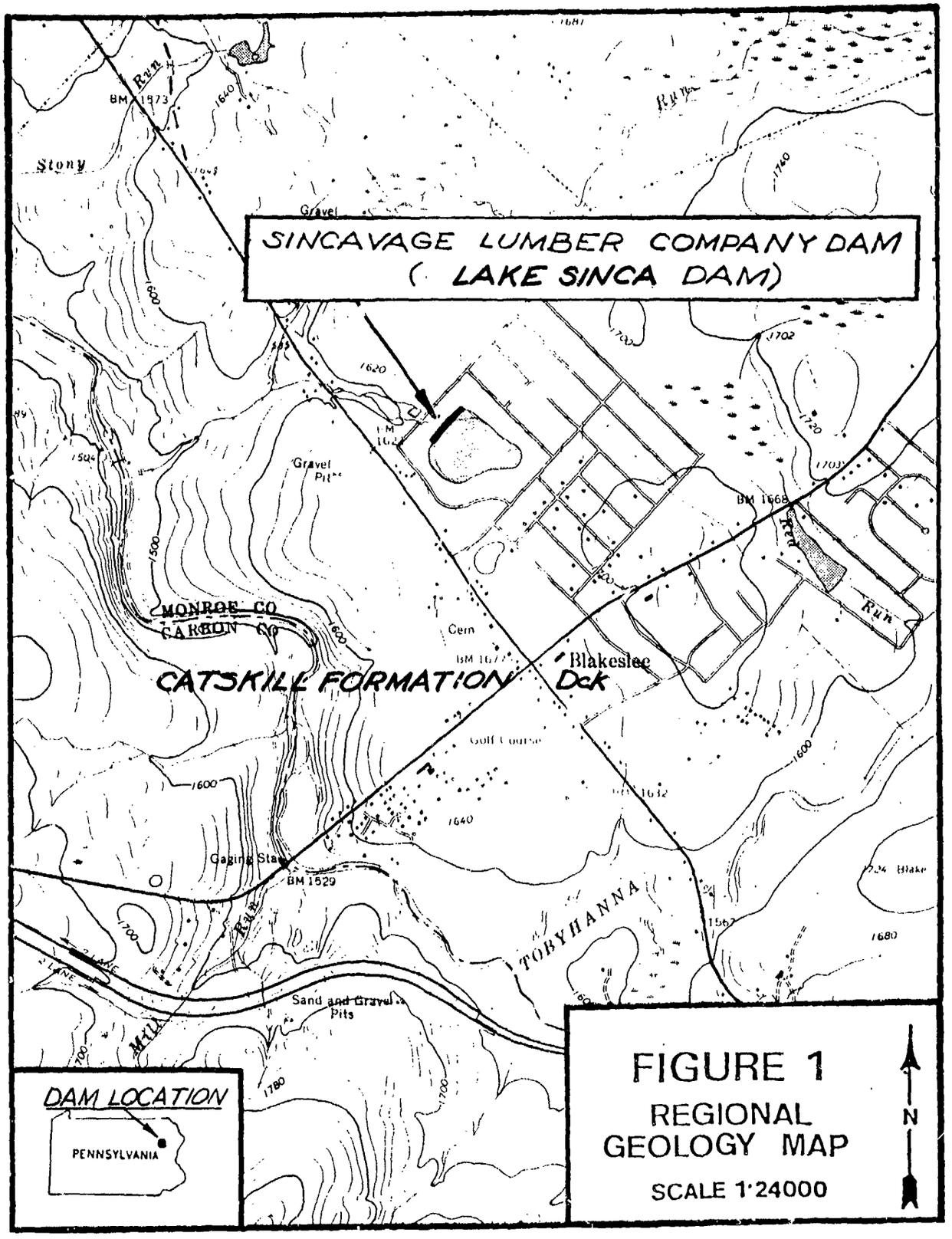
SITE GEOLOGY

SINCAVAGE LUMBER COMPANY DAM

Sincavage Lumber Company Dam is located in Monroe County (PA) within the Pocono Plateau section of the Appalachian Plateaus physiographic province. The site is underlain by gently northwestward dipping beds of the Devonian Catskill group continental type sedimentary rocks. These consist of red to brown and gray shales, siltstones, sandstones and conglomerates varying from a few inches (flagstones) to several feet or more in thickness. Wisconsin epoch glacial deposits of sand and gravel mantle the rock surface and attain considerable thicknesses along valley floors and side slopes. Some swamp deposits occur where depressions or kettles exist as a result of the isolation and decay of ice during the retreat of the last glacial advance into the area.

No active structural faults are known to exist in the area.

Well developed jointing and fracturing occur in the bedrock units, particulary in the shales and siltstones. The Catskill rocks yield excellent quality groundwater and the formation is considered a fair to good aquifer. Glacial deposits occurring in the valley floor are quite permeable and act as excellent sources of groundwater and recharge to the underlying Catskill group sedimentary units.


SINCAVAGE LUMBER COMPANY DAM
(LAKE SINCA DAM)
Stony
Run
BM 1973
Gravel
Gravel Pit
BM 1668
MONROE CO
CARBON CO
CATSKILL FORMATION
Cem
BM 1677
Blakeslee
Dck
Golf Course
Gaging Sta
BM 1529
TOBYHANNA
Sand and Gravel Pits
DAM LOCATION
PENNSYLVANIA
FIGURE 1
REGIONAL
GEOLOGY MAP
SCALE 1:24000
N